KANSAS STATE UNIVERSITY


K-STATE
TELEFUND
WILDCATS

LETTER FROM THE PRESIDENT

SEVERAL PERIODS OF GROWTH MARKED THE FIRST 150 YEARS OF KANSAS STATE UNIVERSITY'S HISTORY. THE UNIVERSITY GREW FROM A MODEST THREE-STORY BUILDING ON WHAT TODAY IS CALLED FOUNDER'S HILL TO A STATEWIDE PRESENCE AND A THREE-CAMPUS SYSTEM. OUR FORBEARERS HAD VISION AND DETERMINATION, WHICH HELPED CREATE OUR HISTORIC AND BEAUTIFUL MAIN CAMPUS IN MANHATTAN. JUST AS OUR ANCESTORS WERE GOOD TO US, WE OWE FUTURE GENERATIONS THE GIFT OF PLANNED GROWTH AND A THRIVING, VIBRANT PLACE TO LIVE, WORK, AND STUDY.

ONE STEP IN OUR K-STATE STRATEGIC PLANNING PROCESS HAS BEEN THE UPDATING OF OUR MASTER PLAN TO GUIDE OUR FUTURE GROWTH. WE CONSIDER THE PLAN A ROAD MAP TO SUPPORT DECISIONS AND TO IDENTIFY OPPORTUNITIES. AS YOU READ AND CONTEMPLATE THIS PLAN, WE ASK THAT YOU JOIN US IN ENVISIONING OUR COLLECTIVE FUTURE.

A CAMPUS MASTER PLAN IS ONE WAY TO VISUALIZE OUR NEEDS AND WANTS. TALKING WITH FACULTY, STUDENTS, STAFF, ALUMNI AND FRIENDS OF K-STATE, WE WERE ABLE TO CREATE A COMPELLING VISION FOR 2025. KEEP IN MIND THAT THIS PLAN IS LIKELY TO EVOLVE, AS PLANS INVARIABLY DO BASED ON THE AVAILABILITY OF FUNDING AND OTHER FACTORS. IT IS A SET OF GUIDELINES, RATHER THAN A RULEBOOK; YET CAN PROVIDE GUIDANCE AS WE USE OUR SHARED GOVERNANCE STRUCTURE TO MAKE DECISIONS.

IF WE WERE TO GET A MAJOR GIFT TOMORROW, THE MASTER PLAN GIVES US THE FRAMEWORK TO DISCUSS PRIORITIES. THE MASTER PLAN ISN'T A TIMELINE. IT WON'T TELL US WHEN TO EXPECT A NEW GENERAL CLASSROOM BUILDING TO OPEN OR A RENOVATION TO BEGIN ON ONE OF OUR HISTORIC STRUCTURES. WHAT IT DOES TELL US IS WHERE WE SHOULD STRATEGICALLY BE CONCENTRATING OUR RESOURCES.

A BUILDING IS NEVER JUST A STRUCTURE, AND NOWHERE IS THAT MORE TRUE THAN ON A COLLEGE CAMPUS. OUR BUILDINGS SHOULD ACCOMMODATE TODAY'S STUDENTS' LEARNING STYLES, PROVIDE ENVIRONMENTS FOR RESEARCHERS TO MAKE GROUNDBREAKING DISCOVERIES, AND EMBRACE A CULTURE OF ACADEMIC EXCELLENCE AND CREATIVE ENDEAVOR.

WE ENCOURAGE YOU TO VISIT K-STATE.EDU/MASTERPLAN/ THROUGHOUT THE PROCESS OF BUILDING A ROAD MAP TO OUR GOAL: BECOMING A TOP 50 PUBLIC RESEARCH UNIVERSITY BY 2025. LET'S MAKE THIS JOURNEY TOGETHER.

KIRK SCHULZ, PRESIDENT

RUTH DYER, SENIOR VICE PROVOST FOR ACADEMIC AFFAIRS

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CLASS OF
1974

THE KANSAS STATE UNIVERSITY CAMPUS MASTER PLAN UPDATE ADDRESSES WHERE THE MANHATTAN CAMPUS CAN PROVIDE THE FACILITIES NECESSARY FOR THE UNIVERSITY TO ACHIEVE ITS VISIONARY GOAL TO BE A TOP 50 PUBLIC RESEARCH UNIVERSITY BY 2025. IN FACT, THE CAMPUS MASTER PLAN UPDATE IDENTIFIES CAMPUS DEVELOPMENT POTENTIAL THAT EXCEEDS THE DEMANDS OF K-STATE 2025. NOT ONLY WILL THE ENVISIONED IMPROVEMENTS ADVANCE THE GOALS OF THE STRATEGIC PLAN, BUT THEY WILL ALSO ENHANCE THE EXPERIENCE OF STUDENTS, FACULTY, STAFF, AND VISITORS TO THE CAMPUS.

ENHANCEMENTS TO THE PHYSICAL CAMPUS

The Campus Master Plan proposes a variety of improvements that would enhance physical facilities for academic and research activity on campus. While the projects are not in any sequential order of development, this comprehensive list includes near- and long-term projects.

Academic and Research Facilities

A - F. See *Campus Life,* page 10

G. Expansion of Ackert Hall provides new space for academic programs.

H. A new quadrangle provides additional space for academic programs, likely the sciences, and expands the open space network to better connect Kramer Complex to the core campus.

I. Expansion of the College of Engineering complex supports the State of Kansas University Engineering Initiative Act.

J. Expansion and renovation of Seaton Hall provides new academic program space.

K. *See Campus Life,* page 10

L. New construction as recommended by the College of Veterinary Medicine Master Plan expands the College; campus open space network enhancements expand the KSU Gardens north of Jardine Drive.

M. New construction between Umberger and Dole Halls provides new space for academic programs.

N. Expansion of Cardwell Hall provides new space for academic programs.

O. A new quadrangle North of Jardine Drive provides additional program space, likely research activity, and improves connectivity among the College of Veterinary Medicine, the K-State Research Park, and the core campus.

P. A new quadrangle south of Jardine Drive provides additional program space, likely research activity, and expands the campus open space network to improve north-south connectivity.

Q. New construction provides additional space for academic programs or research activity with views of a rejuvenated Campus Creek.

R. A new quadrangle provides additional space for academic programs, likely the College of Arts and Sciences or Agriculture, and expands the campus open space network to improve north-south connectivity.

S. New construction north of Waters Hall provides additional space for academic programs; likely a general classroom building.

T. Expansion of the International Student Center provides additional square footage for the program with views of a rejuvenated Campus Creek.

U. New construction south of Jardine Drive, adjacent to North Manhattan, provides additional space for academic programs.

V. See *Campus Life,* page 10

W. See *Campus Life,* page 10

X. New construction north of Dickens Hall provides additional space for academic programs.

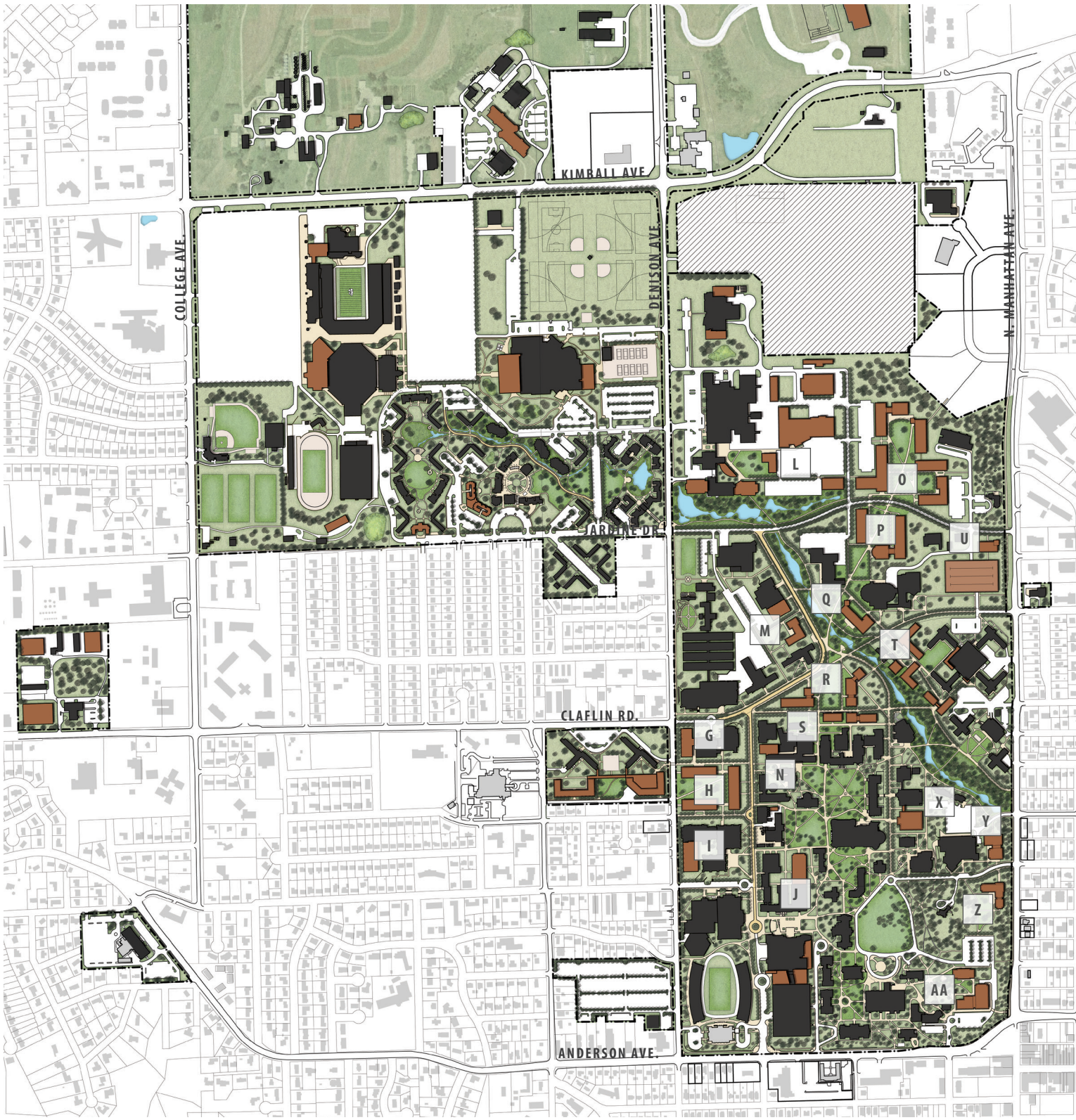
Y. New construction east of Justin Hall provides additional space for academic programs.

Z. New construction along North Manhattan Avenue provides a new home for the College of Business Administration.

AA. New construction provides additional space for performing and academic arts programs.

CAMPUS MASTER PLAN ▶

EXISTING CAMPUS BUILDING
PROPOSED CAMPUS BUILDING
NBAF
KSU CAMPUS BOUNDARY
KSU FOUNDATION PROPERTY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Campus Life & Support

Similarly, the Campus Master Plan proposes improvements to campus grounds and facilities to enhance and support the day-to-day experience of campus life for faculty, staff, students, and visitors. This comprehensive list includes near- and long-term projects.

NEW FACILITIES

A. A new indoor rowing facility supports Athletics programs.

B. Expansion of the Peters Recreation Complex meets student sports activities and exercise needs.

C. New residence halls provide additional on-campus housing for students; landscape and circulation improvements enhance the neighborhood feel of this part of the campus.

D. A new recreation facility with basketball, sand volleyball, and tennis supports Recreation and Athletics programs.

E. New construction provides additional space for Facilities Management programs to support new campus development.

F. Expansion and renovation of Kramer Dining Center enhances residential dining; new residence halls provide additional on-campus housing for students.

K. Expansion of the K-State Student Union creates new space for current and future needs of student programs and activities. More detailed recommendations for the renovation and expansion of the Union were developed by the K-State Student Union Study.

V. New structured parking provides as many as 1,600 additional spaces.

W. Expansion and renovation of Derby Dining Center enhances residential dining; new residence halls provide additional on-campus housing for students with views and access to a rejuvenated Campus Creek.

All other letters, see Academic and Research Facilities, page 8.

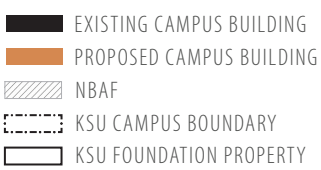
Coordination with Other Initiatives

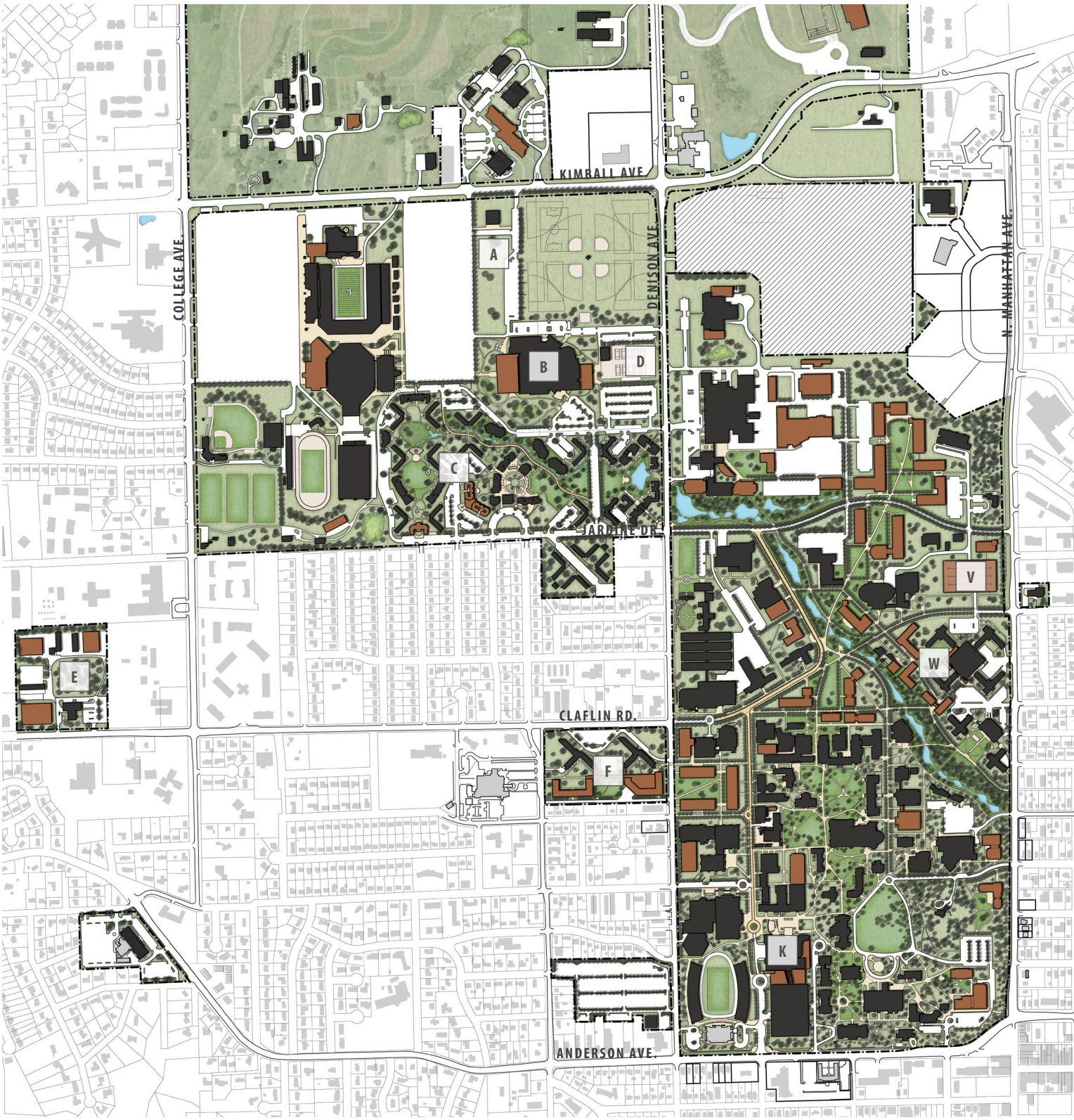
A series of more detailed studies supported the development of the Campus Master Plan Update, including the K-State Student Union Study, the Housing and Dining Services Master Plan, the Signage and Wayfinding Master Plan, and the Veterinary Medicine Master Plan. Each of these studies documents additional findings and recommendations about the future of the physical campus that supplement the broad vision of the Campus Master Plan.

Phasing and Implementation

Implementation of the Campus Master Plan will be realized through the completion of individual projects. The exact order and disposition of design details of projects will naturally evolve as additional information about the university's needs and priorities becomes available. Implementation of the Campus Master Plan will be guided by university administration, Campus Planning and Facilities Management, and a variety of campus advisory committees, among others the Faculty Senate Committee on University Planning, the Landscape Advisory Committee, the Campus Planning and Development Advisory Committee, and the Council on Parking Operations will use these three planning tools to guide the physical development of the campus.

CAMPUS MASTER PLAN ▶

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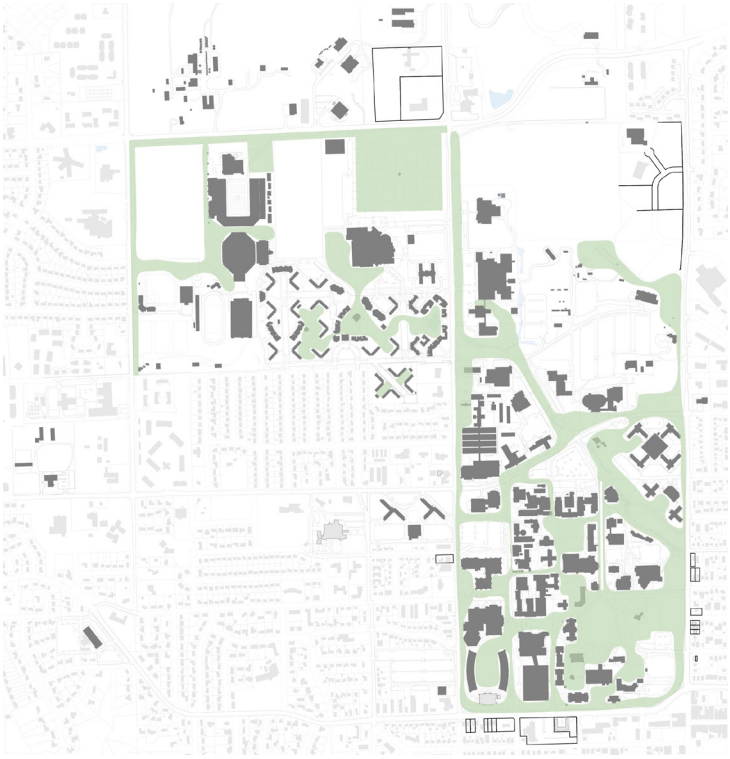
OPEN SPACE NETWORK ENHANCEMENTS

1. Seventeenth Street between Claflin Road and the K-State Student Union is closed to daily traffic and redeveloped as a pedestrian priority zone.
2. Mid-Campus Drive between Claflin Road and Lovers Lane is closed to daily traffic and redeveloped as a pedestrian priority zone.
3. Campus Creek is rejuvenated as a recreational, educational, and research resource for the campus; improvements to the creek enhance the open space network and improve north-south connectivity.
4. Jardine Drive is re-aligned and makes a new connection with North Manhattan Avenue to simplify campus circulation.
5. Similar to Mid-Campus Drive, Claflin Road becomes a limited vehicular access drive that is closed to daily traffic, no longer connecting east-west traffic to North Manhattan Avenue through campus. It is redeveloped as a pedestrian priority zone.

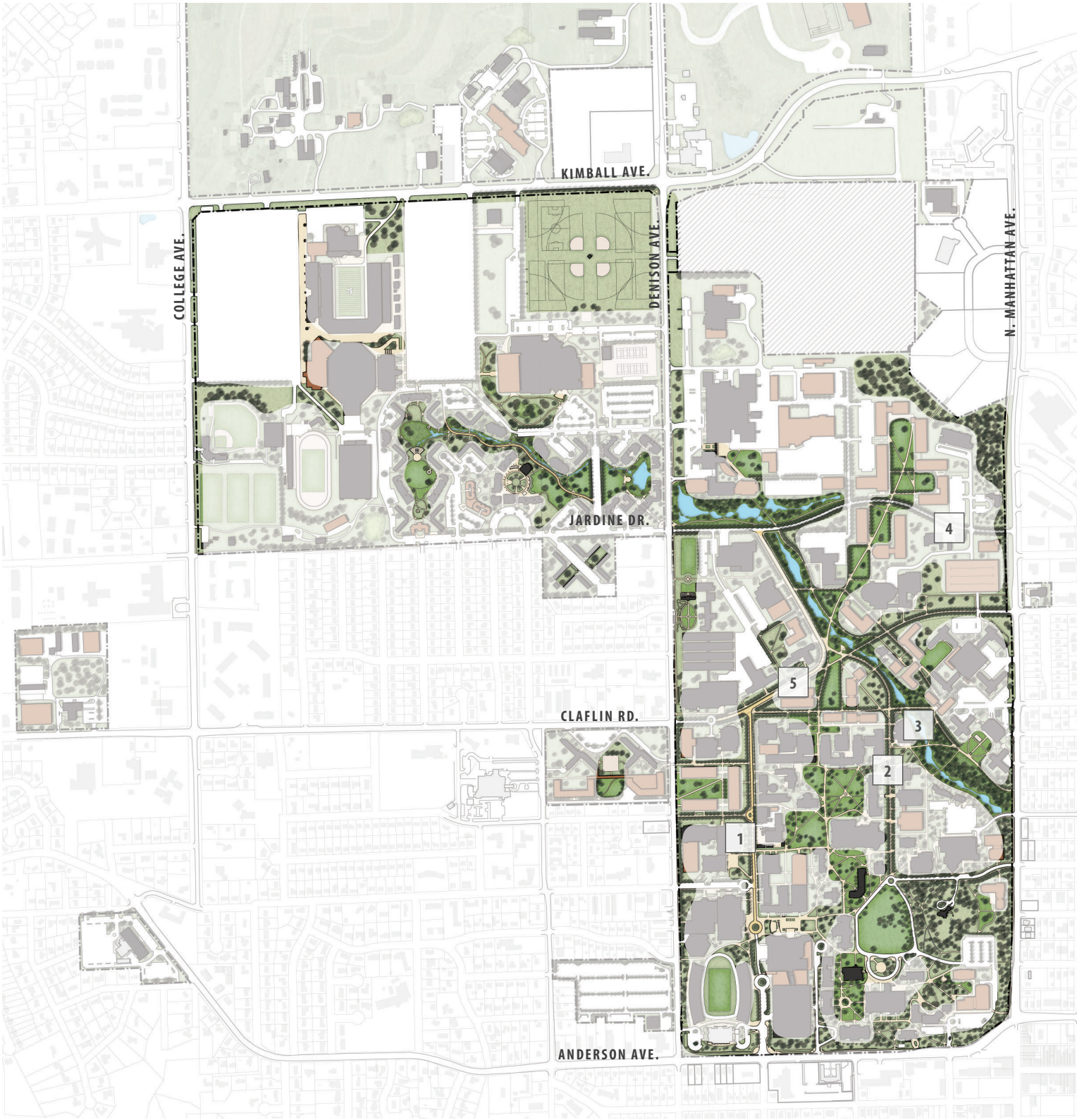


EXISTING OPEN SPACE NETWORK ▲

EXISTING OPEN SPACE
EXISTING CAMPUS BUILDING

PROPOSED OPEN SPACE NETWORK ▶

PROPOSED OPEN SPACE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EXISTING VIEW OF CAMPUS LOOKING NORTH FROM ANDERSON AVENUE.

The Campus Master Plan identifies the potential for many new buildings on the Manhattan campus, as well as enhancements and expansion of the open space network. These “before and after” images illustrate what long-term campus development might look like compared to the existing conditions.

PROPOSED VIEW OF CAMPUS LOOKING NORTH FROM ANDERSON AVENUE.

Implementation of the Campus Master Plan Update will advance the goals of the strategic plan, and enhance the experience of students, faculty, staff, and visitors to the campus.

EXISTING VIEW OF CAMPUS LOOKING SOUTHWEST FROM NORTH MANHATTAN AVENUE.

PROPOSED VIEW OF CAMPUS LOOKING SOUTHWEST FROM NORTH MANHATTAN AVENUE.

At left is a new facility for performing arts programs. This new space will facilitate improvements to McCain Auditorium to better support Academic Arts programs. Located between the new building east of Justin Hall and the aforementioned new performing arts facilities, is a new building for the College of Business Administration.

EXISTING VIEW OF CAMPUS LOOKING SOUTHEAST FROM DENISON AVENUE.

PROPOSED VIEW OF CAMPUS LOOKING SOUTHEAST FROM DENISON AVENUE.

A new quadrangle between Fiedler and Ackert Halls will provide additional program space for academic and research activities.

PLANNING PROCESS

THE PLANNING PROCESS INCORPORATED A VARIETY OF OPPORTUNITIES FOR CAMPUS STAKEHOLDERS TO MAKE THEIR VOICES HEARD.

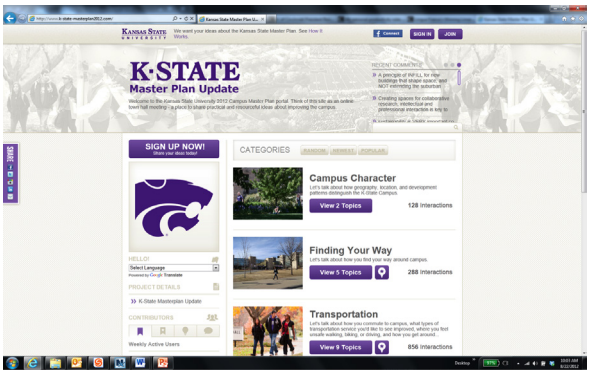
ENGAGEMENT

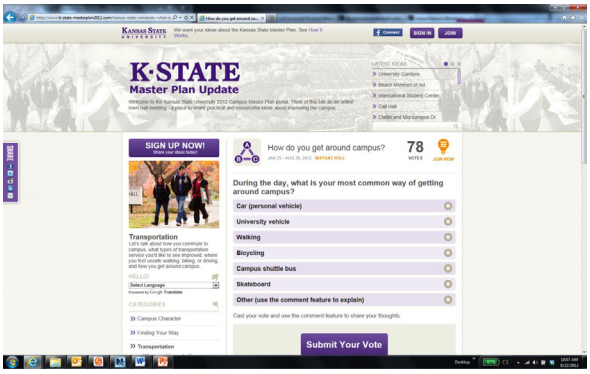
From the start, the university was committed to engaging faculty, staff, students, alumni, trustees, and neighbors, as well as local officials to gather insights about assets and opportunities for the Campus Master Plan.

During a series of on-campus interviews and information sessions, more than 500 university representatives from more than 50 different campus stakeholder groups– including faculty, staff, students – shared ideas and information (see Acknowledgements). Throughout the planning process, details about upcoming events and informational materials were available on the Campus Master Plan Update website, http://www.ksu.ksu.edu/masterplan/. The website included an interactive survey that allowed participants to share ideas and images, in addition to commenting on what others shared. More than 250 participants contributed more than 750 ideas and comments to shape the development of the Campus Master Plan Update. Meetings with community stakeholders including the City of Manhattan and Riley County and institutions neighboring the campus added valuable information to the process (see Acknowledgements).

Not only were information sessions and website input closely aligned, abut faculty and staff identified similar sets of issues during the interview sessions.

As in past planning efforts, the university convened a task force to support the Campus Master Plan Update planning process. The Campus Master Plan Update Task Force comprised a broad spectrum of university stakeholders. The Task Force met regularly to review progress, as well as provide advice and recommendations about the development of the Master Plan Update. Its guidance was instrumental in developing a Campus Master Plan that effectively addresses the needs of the campus.





THROUGHOUT THE PLANNING PROCESS, DETAILS ABOUT UPCOMING EVENTS AND INFORMATIONAL MATERIALS WERE AVAILABLE ON THE CAMPUS MASTER PLAN UPDATE WEBSITE, HTTP://WWW.KSU.KSU.EDU/MASTERPLAN/.

PROCESS

Discovery and Goal Setting

The planning process began with an intense phase of research and analysis called Discovery and Goal Setting. Previous studies and reports were consulted so that the process benefited from existing knowledge and ideas about the campus. Extensive walking and driving tours were conducted to understand the physical context and qualities of the campus. More than 800 members of the campus community provided their input in person during this phase and through comments submitted on the Campus Master Plan Update web site (http://www.ksu.ksu.edu/masterplan/). Taken together, these activities provided a thorough understanding of the physical character and spirit of the campus, and the K-State community that informed the subsequent phases of the planning process.

EXTENSIVE WALKING AND DRIVING TOURS WERE CONDUCTED TO UNDERSTAND THE CAMPUS.

Campus Analysis

With extensive information in hand from Discovery and Goal Setting, the next step in the planning process was to complete a Campus Analysis that synthesized a rich collection of facts into a meaningful composite. The result was a conceptual plan and set of Guiding Principles that served as a touchstone throughout the planning process. Like a sketch before a painting, the conceptual plan was illustrative, but not detailed. It captured the most basic organizational aspects of the campus and foreshadowed the most elemental aspects of the plan to come.

Space Utilization and Needs

Documenting how much space the university has and determining how it is used is key to understanding what new space the university needs today and will need in the future. A university-wide, broad-brush analysis of existing spaces on campus was completed to quantify today's space needs and the projected needs for 2025. Projecting space needs to the target year of 2025 is aligned with the university's strategic plan, *K-State 2025: A Visionary Plan for Kansas State University*.

Idea Generation

During this phase of the planning process, a number of planning options were generated, evaluated, and refined. Much of the design energy during this phase of the planning process was focused on understanding the potential capacity of the core area of the campus.

Interim Updated Plan

The Interim Updated Plan reconciled ideas generated throughout the process to date. This early version of the campus master plan provided a tool for conversation with the Steering and Planning committees about project priority, phasing, and implementation.

Final Plan

The Final Plan was created from the ideas generated in the prior phases of the planning process. The new buildings, circulation changes, and landscape improvements illustrated in this proposal represent the future of the campus through 2025 and beyond. The Final Plan supplements the strategic plan, *K-State 2025*, and the university's 2014 Capital Improvements Plan for the Board of Regents to guide future development and initiatives for the university.

CONCEPT PLAN ▲


K-STATE
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DISCOVERY AND GOAL SETTING

THE PLANNING PROCESS BEGAN WITH AN INTENSE PHASE OF RESEARCH AND ANALYSIS TO DEVELOP A THOROUGH UNDERSTANDING OF THE PHYSICAL CHARACTER AND ETHOS OF THE CAMPUS.

Planning context and history, as well as natural and built systems were carefully studied. The findings from this effort informed the subsequent phases of the planning process.

PLANNING CONTEXT

Kansas State University is a land-grant, public research university committed to teaching and learning, research, and service to the people of Kansas, the nation, and the world. Kansas State University is recognized by the Princeton Review as one of America's best colleges, and U.S. News & World Report lists the university among the top 75 public universities in the nation. The main campus is located in Manhattan, Kansas, a classic college town with more than 52,000 residents. The university also has campuses in Salina and Olathe, and a Research and Extension presence in every county of the state.

K-State at Salina is home to the College of Technology and Aviation. It offers associate and bachelor degrees in the fields of engineering technology, professional pilot, aviation maintenance, technology management, and family studies and human services.

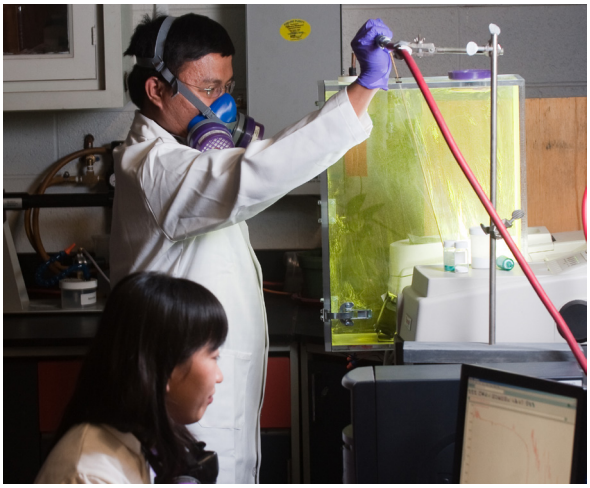
Kansas State University's Olathe Campus is the academic research presence within the Kansas Bioscience Park, providing a direct portal to K-State's broad capabilities and its many resources on the Manhattan campus.

University Mission

The mission of Kansas State University is "to foster excellent teaching, research, and service that develop a highly skilled and educated citizenry necessary to advancing the well-being of Kansas, the nation, and the international community. The university embraces diversity, encourages engagement, and is committed to the discovery of knowledge, the education of undergraduate and graduate students, and improvement in the quality of life and standard of living of those served."

University Strategic Plan

In February 2010, the university launched an ambitious planning initiative with the visionary goal to be recognized as a Top 50 Public Research University by 2025. *K-State 2025: A Visionary Plan for Kansas State University* defines K-State not only as a great place for students, but also as a modern land-grant university valuing and integrating research, education, and engagement on behalf of the community, state, nation, and society. It expresses K-State's desire to pursue a culture of excellence in every endeavor. As a living plan, *K-State 2025* serves as a guide for decision-making and priority setting.



THE UNIVERSITY WILL CONTINUE TO INCREASE OUTSIDE FUNDING FOR RESEARCH TO ACHIEVE THE GOALS OF *K-STATE 2025*.

THEMATIC GOALS

As part of the strategic planning process, seven theme areas with goals, associated action plans, and expected outcomes were defined as follows:

Research, Scholarly and Creative Activities, and Discovery
Create a culture of excellence that results in flourishing, sustainable, and widely recognized research, scholarly and creative activities, and discovery in a variety of disciplines and endeavors that benefit society as a whole.

Undergraduate Educational Experience
Build a connected, diverse, empowered, engaged, participatory culture of learning and excellence that promotes undergraduate student success and prepares students for their professional, community, social, and personal lives.

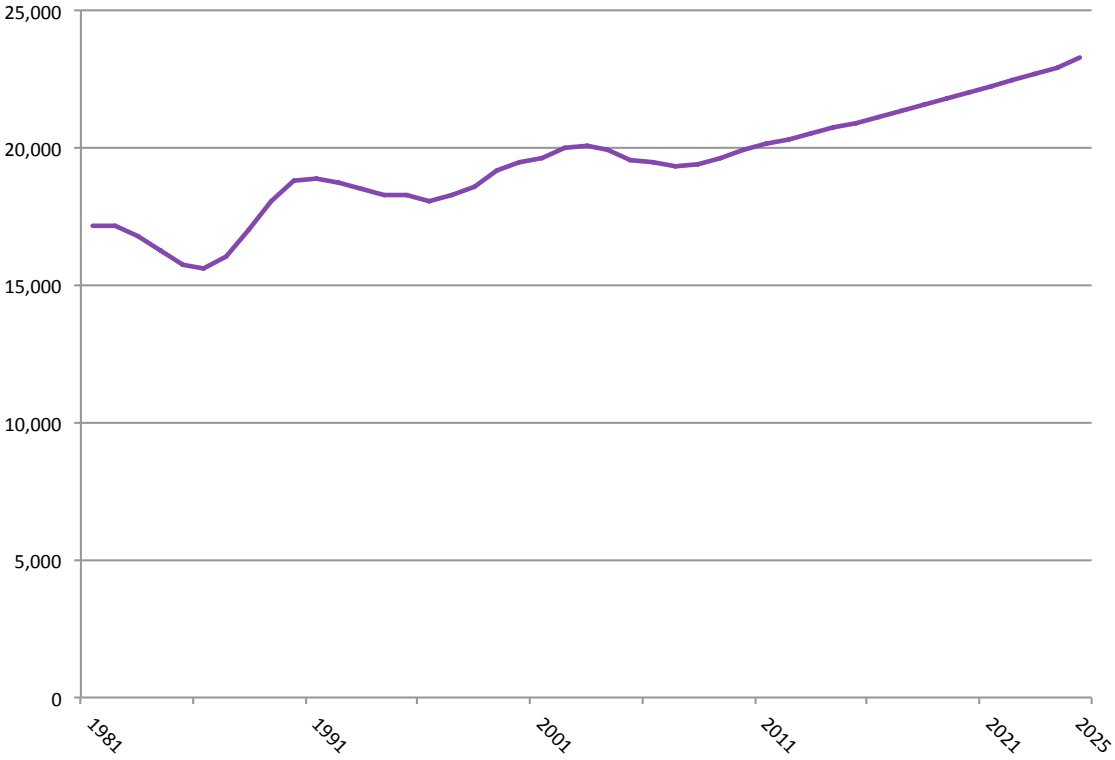
Graduate Scholarly Experience
Advance a culture of excellence that attracts highly talented, diverse graduate students and produces graduates recognized as outstanding in their respective professions.

Engagement, Extension, Outreach, and Service
Be a national leader and model for a re-invented and transformed public research land-grant university integrating research, education, and engagement.

Faculty and Staff
Foster a work environment that encourages creativity, excellence, and high morale in faculty and staff, responds to changing needs, embraces diversity, values communication and collaboration, and is respectful, trusting, fair, and collegial for all.

Facilities and Infrastructure
Provide facilities and infrastructure that meet our evolving needs at a competitive level with our benchmark institutions and are an asset to recruit and retain quality students, faculty, researchers, and staff.

Athletics
Strengthen the interconnectivity between intercollegiate athletics and the campus community to prepare our student-athletes for success in school, in sport, and after graduation and benefit our university, community, and state.



HEADCOUNT ENROLLMENT 1981 - 2025 ▲

How K-State 2025 Impacts the Campus Master Plan

K-State's visionary goal to be recognized as a Top 50 Public Research University by 2025 creates significant expectations for the Campus Master Plan Update. To realize the visionary goal, the physical campus will need to provide new and renovated facilities to accommodate potential institutional growth.

RESEARCH GROWTH

One common measure of top public research universities is the annual amount of outside funding. Today, K-State attracts about $150 million in outside funding from federal agencies and other sources. To be considered a Top 50 Public Research University by the National Science Foundation, K-State will need to increase outside funding by $100 to $150 million between now and 2025. Clearly, additional square footage will be needed to accommodate expanded research efforts.

ENROLLMENT GROWTH

The university projects average enrollment growth among K-State's eight colleges of about 12 percent between now and 2025. This growth follows a modest incremental trend of the past 30 years. The projected growth for each college varies, with the greatest growth projected for the College of Arts and Sciences, the College of Agriculture, and the College of Engineering. Growth of the College of Arts and Sciences is necessary to support growth of other academic programs. Strong growth in the College of Agriculture is expected in association with plans for the National Bio and Agro-Defense Facility (NBAF) adjacent to the campus. Growth of the College of Engineering is K-State's direct response to the State of Kansas University Engineering Initiative Act that will increase the number of engineering graduates by almost 60 percent in the state of Kansas over a 10-year period.

HIGH-QUALITY ACADEMIC PROGRAMS AND A WARM COMMUNITY SPIRIT MAKE K-STATE A DESTINATION FOR SCHOLARS.

ACADEMIC EXPERIENCE

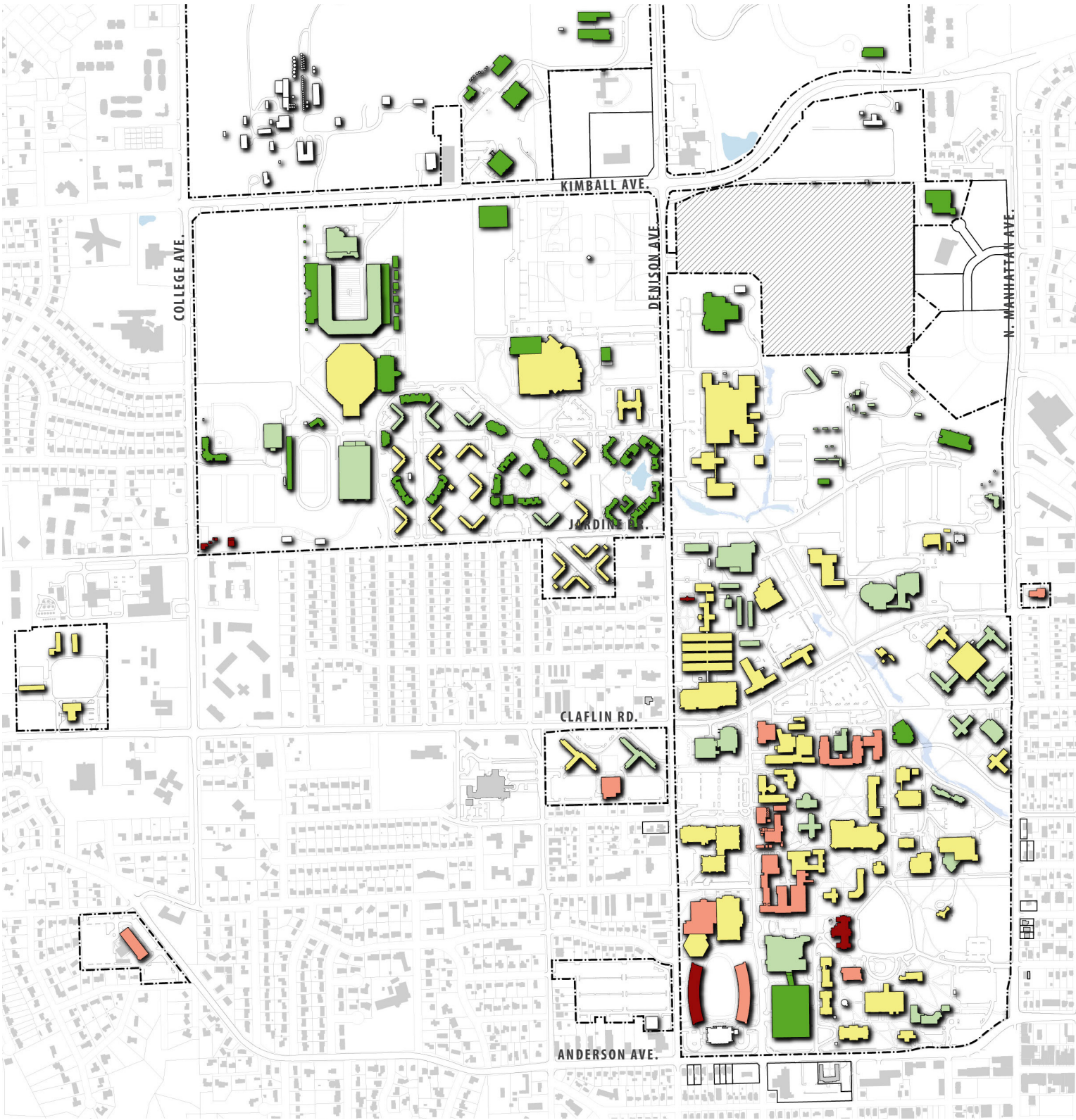
While K-State is a large institution and home to outstanding academic programs, its campus community is remarkably close-knit and intimate. This blend of high-quality academic programs and a warm community spirit makes the campus and Manhattan a desirable destination for scholars from all disciplines. The university will continue to enhance the quality of academic programs while nurturing the open and friendly nature of the campus.

DEFERRED MAINTENANCE

While the Manhattan campus is charming, many of the facilities are in dire need of renovations and repairs. Sightlines' Fiscal Year 2011 Space Profile of K-State facilities reported that 90 percent of campus buildings are more than 25 years old and 50 percent are more than 50 years old. Some of the most iconic and historic buildings on campus are in poor or unsatisfactory condition, including Anderson Hall and West Memorial Stadium. To accommodate projected institutional growth, the university needs to devote considerable resources to the renewal of existing facilities, in addition to the construction of new ones.

BUILDING CONDITION* ▶ EXCELLENT (C.V. = 90-100) GOOD (C.V. = 80-89) DEFICIENT (C.V. = 60-79) POOR (C.V. = 30-59) UNSATISFACTORY (C.V. = 0-29)

* Building Condition Value (C.V.) from Kansas Board of Regents Building Inventory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Natural and Built Systems

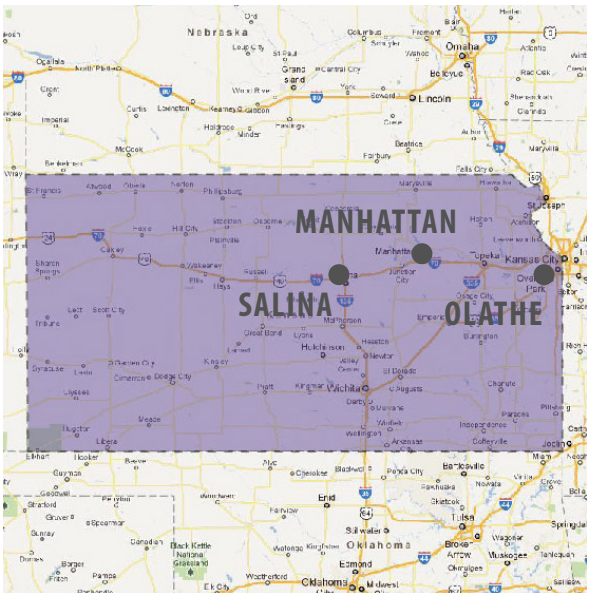
The existing conditions of the campus – its natural and built systems – are a window into the opportunities and challenges of the physical campus. Documenting the physical qualities of the campus is a logical step to understand the planning context. Understanding the existing conditions of the natural and built features of the campus is a critical step in developing a practical campus master plan.

REGIONAL LOCATION

The main campus of Kansas State University is located on about 660 acres in Manhattan, Kansas. First settled in 1855, the Manhattan community encompasses approximately 18 square miles with a most recent census population count of 52,281. Located in Riley County, Manhattan, also known as the "Little Apple," is the county's largest city and county seat. The oldest shopping district in Kansas, Aggieville is located immediately to the southeast of campus and is home to a wide variety of restaurants, businesses, and services. Since 1889, Aggieville has served the K-State community and all Manhattan residents (http://www.aggieville.org/about/).

Manhattan is located 120 miles west of Kansas City, and serves a three-county, 200,000-population regional area as a leader in education, trade, health care, entertainment, culture, and communications. Fort Riley and Kansas State University are the county's two largest employers (http://www.ci.manhattan.ks.us/index.aspx?NID=127).

The KC Animal Health Corridor between Columbia, Missouri, and Manhattan, Kansas, is the single largest concentration of animal health interests in the world. The corridor is home to 75 animal health businesses, seven interested educational institutions, and numerous affiliated trade organizations and service providers. Key players in the region have joined together to cultivate a supportive climate for animal health industry and research.



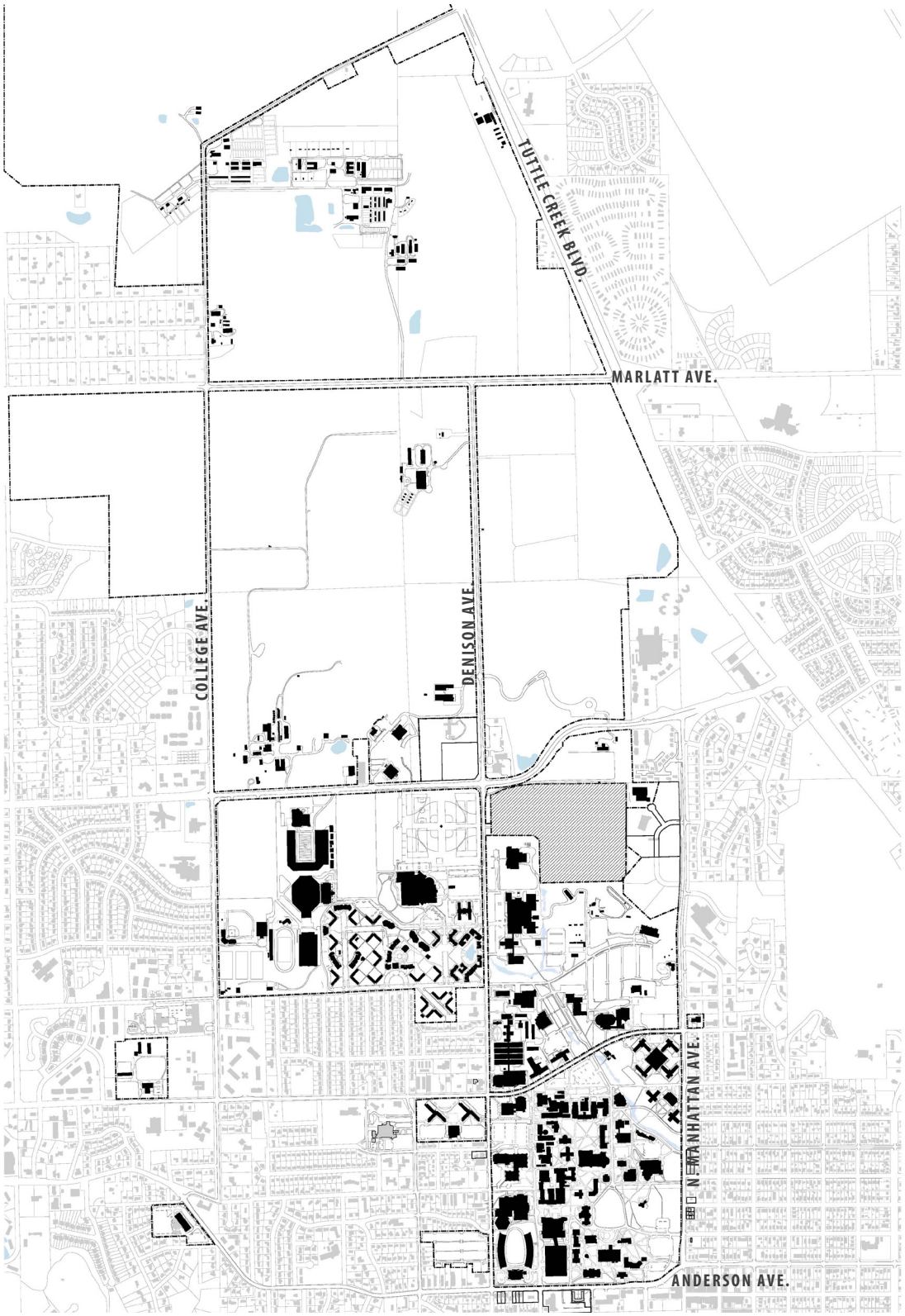
REGIONAL LOCATION ▲

KANSAS
K-STATE CAMPUS LOCATIONS

KSU MANHATTAN CAMPUS ▶

EXISTING CAMPUS BUILDING
NBAF
KSU CAMPUS BOUNDARY
KSU FOUNDATION PROPERTY

THE KSU MANHATTAN CAMPUS COMPRISES ABOUT 660 ACRES.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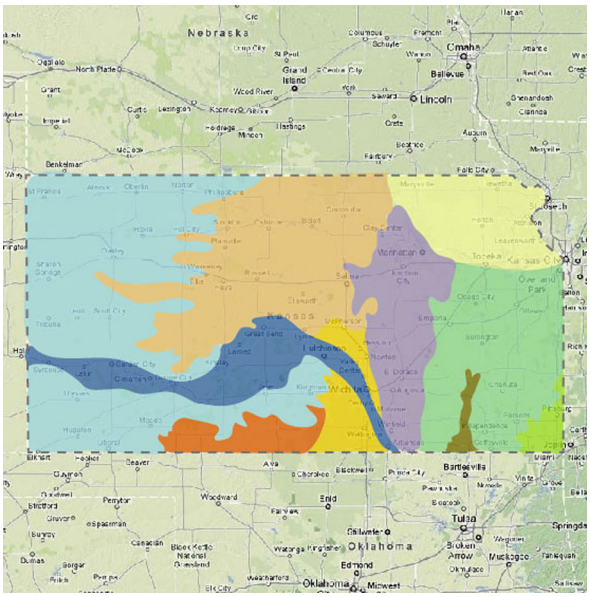
ANDERSON AVE.

REGIONAL GEOGRAPHY

Kansas' landscape has been shaped by geologic processes in the past and human activities, such as farming and mining, resulting in diverse physical qualities. Based on common features and geological history, Kansas is understood as 11 different regions or physiographic provinces. K-State is located in the Flint Hills, defined by numerous bands of flint in their limestone composition. Flint is much less soluble than limestone and the weathering of the limestone has left behind a clay soil full of flinty gravel. Most of the hilltops in the region are capped with this flinty gravel, which generally makes the land better suited to ranching than farming. As a result, prairie grassland of the Flint Hills creates one of the last great preserves of tall grass prairie in the country. K-State has exceptional access to this natural resource via the Konza Prairie Biological Station. The research station and preserve includes more than 8,600 acres of native tall grass prairie.

TOPOGRAPHY

K-State's main campus in Manhattan encompasses approximately 660 acres. Over the breadth of the main campus there is about 160 feet of grade change. The most historic area of the campus is located on the most gently sloping part of the campus and much of development has been concentrated on a relatively flat ridge that runs northeast-southwest through the campus. On the northeast side of the ridge, the land slopes gently down to Campus Creek, which runs roughly parallel to the ridge. The land rises up considerably on the far east side of Campus Creek.

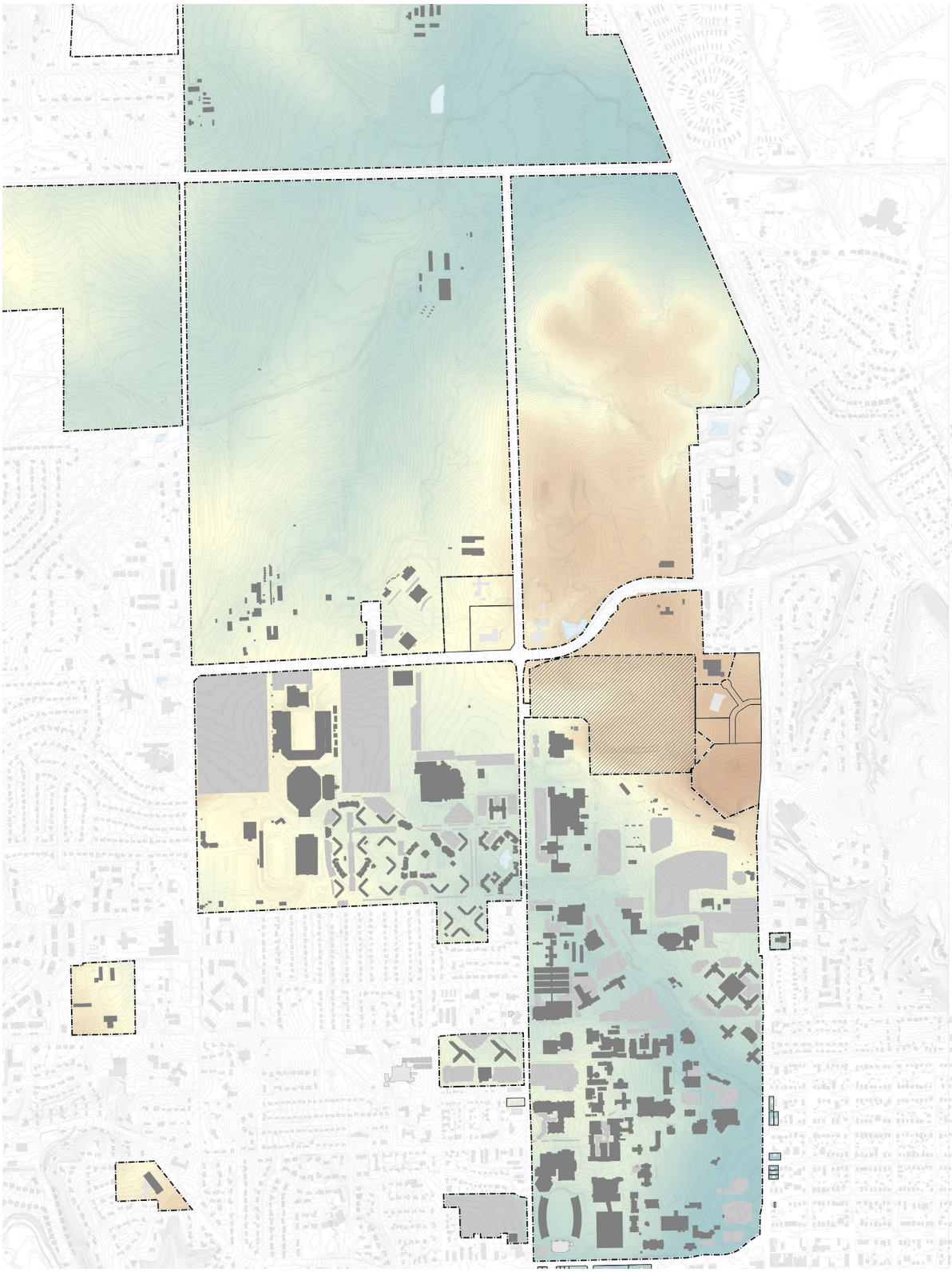


GEOLOGIC LANDFORMS ▲

- FLINT HILLS UPLANDS
- SMOKY HILLS
- GLACIATED REGION
- HIGH PLAINS
- OSAGE CUESTAS
- ARKANSAS RIVER LOWLANDS
- RED HILLS
- WELLINGTON LOWLANDS
- CHAUTAUQUA HILLS
- CHEROKEE LOWLANDS
- OZARK PLATEAU

TOPOGRAPHY ▶

- HIGHER ELEVATION
- LOWER ELEVATION



OPEN SPACE

Additional information can be found in the report prepared by Vireo.

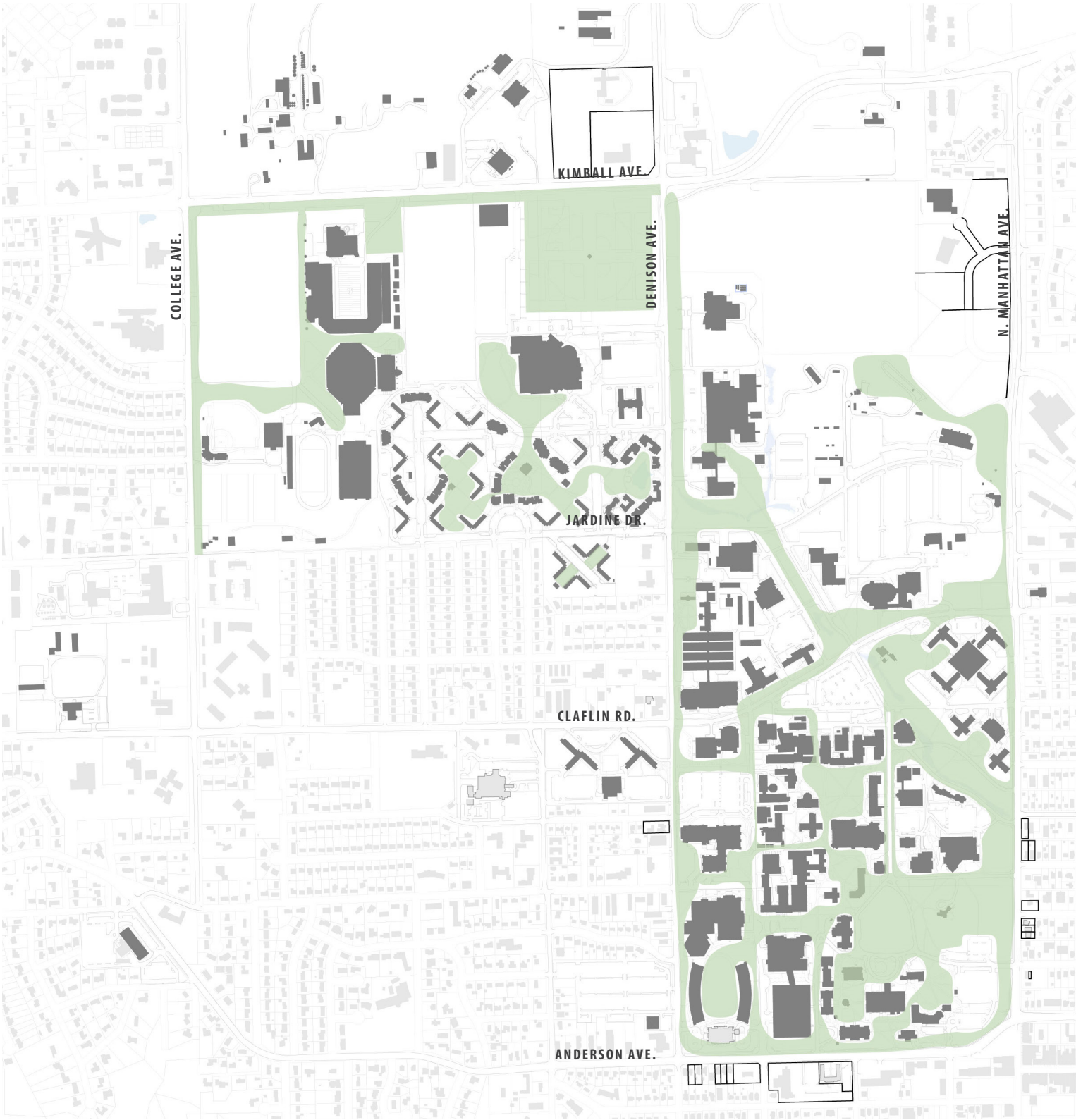
Open space connects the modern campus to its historic land-grant designation and its native prairie setting. It defines university identity, demonstrating to visitors, students, faculty and staff K-State's values. For example, just north of the limestone wall that rings the original area of the campus are a few historic pines, the remains of a windbreak planted to defend the campus against fierce prairie winds. North of McCain Auditorium, the oldest trees around the Vietnam Veterans Memorial are vestiges of field research to determine those specimens best suited to prairie conditions.

There are several distinct types of open spaces present on the Manhattan Campus; each of these spaces contributes to a high-quality campus experience and plays a role in the academic and research pursuits of the university:

- Edges and entrances at the perimeter of campus define the physical boundary between the campus and community. These spaces establish identity and sense of place.
- Quadrangles are large open greens that are framed by buildings. These iconic spaces usually consist of turf, trees, and pathways and are the site of both official university functions and impromptu gatherings.
- Plazas are characterized by an expanse of pavement and are furnished with a variety of seating. Active spaces, plazas support high volumes of pedestrian traffic.
- Courtyards are smaller, more intimate spaces, usually enclosed on two or three sides by buildings. These spaces are often landscaped as a garden and can be planted with a diverse range of flora.
- Natural greens in Kansas are typically planted with native prairie plants. Their tie to the historic landscape of the region demonstrates stewardship of the land. While there will never be true native prairie on campus, some areas may be landscaped as meadows with native plants.
- Agricultural research lands to the north of campus offer students hands-on opportunities for learning.
- Woodland and riparian habitats are located in the Campus Creek valley and play a functional role in protecting water quality.
- Playing fields support competitive and recreational university activity.

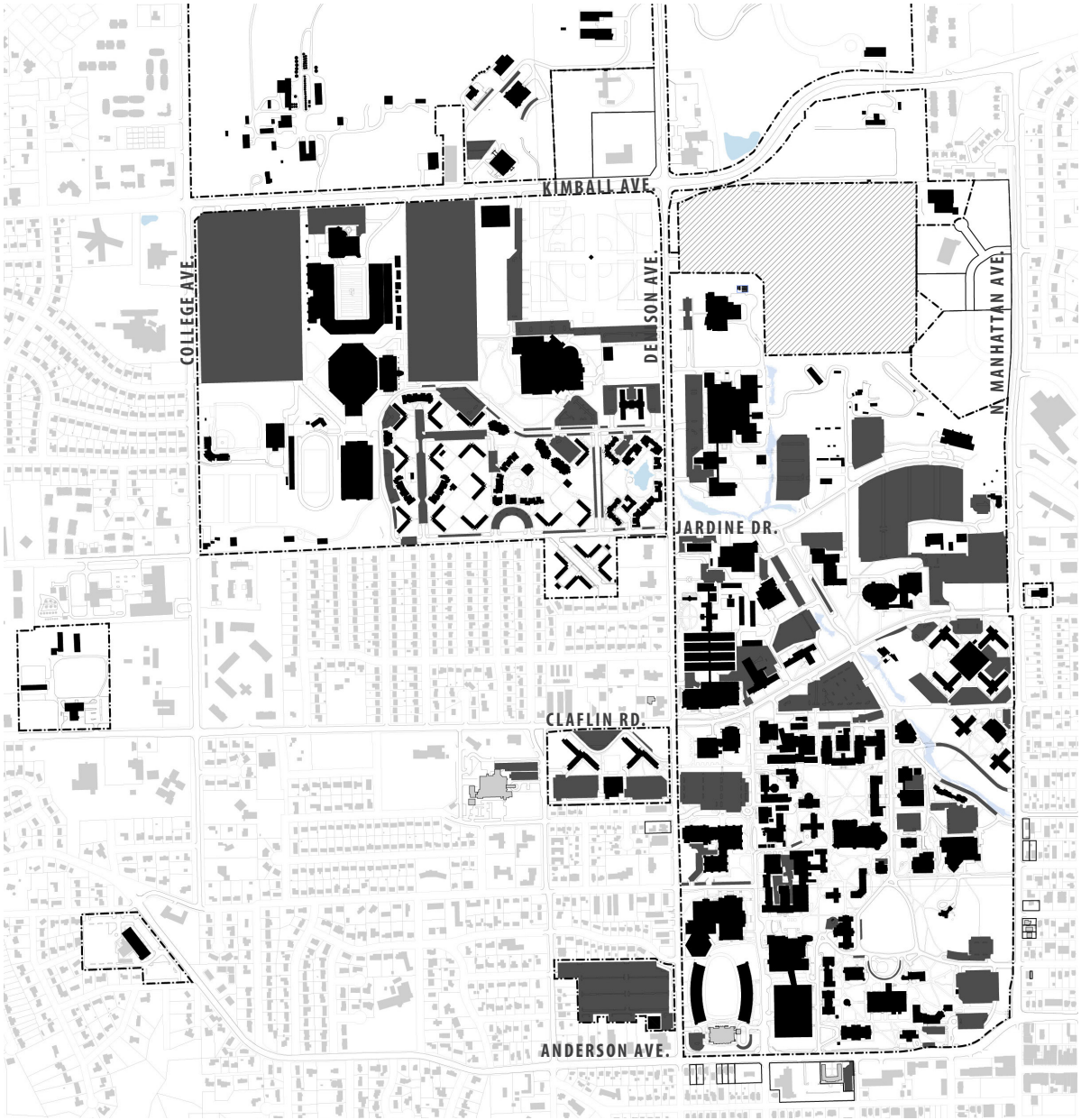
OPEN SPACE NETWORK ▶

EXISTING OPEN SPACE
EXISTING CAMPUS BUILDING


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.

IMPERVIOUS SURFACE

Impervious surfaces – streets, parking lots, sidewalks, plazas, roofs – prevent the percolation of water into the ground, creating stormwater run-off. Impervious surface is typically associated with development, and there is significant impervious surface on the campus. If all impervious surface on the campus was arranged contiguously it would cover about 287 acres of land or about 43 percent of the approximately 660 acres that comprise the Manhattan campus. Impervious surface increases the speed and quantity of stormwater run-off that needs to be managed; it also decreases the quality of stormwater run-off.



IMPERVIOUS SURFACE ◄

IMPERVIOUS SURFACE - AGGREGATE ▼

BUILDING
SURFACE PARKING
NBAF
KSU CAMPUS BOUNDARY
KSU FOUNDATION PROPERTY

IF ALL IMPERVIOUS SURFACE WAS ARRANGED CONTIGUOUSLY, IT WOULD COVER ABOUT 287 ACRES OF LAND.

CAMPUS ZONES

The Manhattan campus is made up of three distinctive zones: the Historic Core Campus, Mid-Campus, and the North Campus. The Historic Core Campus was the area first developed for academic use and includes the oldest buildings on campus. On the west side of the Historic Core Campus, the Kramer Complex consists of traditional residence halls and a dining center. On the east side, the Derby and Strong complexes comprise traditional residence halls and suites, as well as two dining centers. This zone also comprises the majority of the academic undergraduate experience.

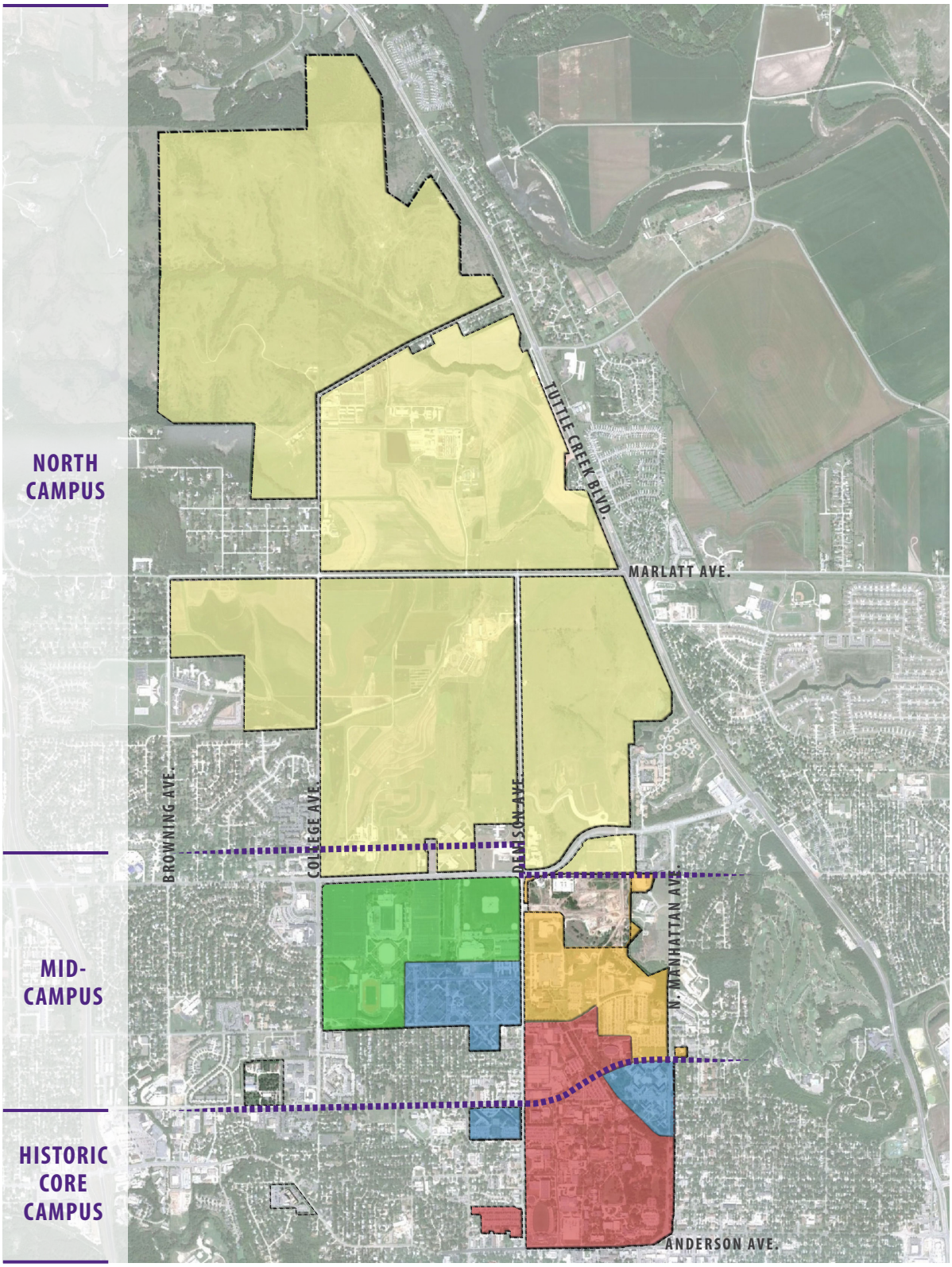
The Mid-Campus is located between the Historic Core Campus and Kimball Avenue. This area is home to the College of Veterinary Medicine and is immediately adjacent to the 25-acre KSU Research Park and the National Bio and Agro-Defense Facility. Jardine Apartments are located west of Denison Avenus in this zone. An area of athletics and recreation use between Denison and College Avenues and south of Kimball Avenue provides facilities for the more active aspects of campus life.

North of Kimball Avenue is the North Campus. This zone of the campus is mostly used for agricultural, veterinary, and research activities.

THE CAMPUS CORE IS THE MOST HISTORIC PART OF THE CAMPUS AND INCLUDES THE OLDEST BUILDINGS ON CAMPUS.

MAJOR CAMPUS ZONES & USES ▶

- PRIMARY ACADEMIC
- RESIDENTIAL
- VETERINARY AND RESEARCH
- AGRICULTURE, VETERINARY, AND RESEARCH
- ATHLETICS AND RECREATION
- ZONE DIVISION


NORTH CAMPUS
MID-CAMPUS
HISTORIC CORE CAMPUS
TUTTLE CREEK BLVD.
MARLATT AVE.
BROWNING AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
ANDERSON AVE.

Together, these three zones order the land use of the campus. The Campus Master Plan will support this logical pattern of use.

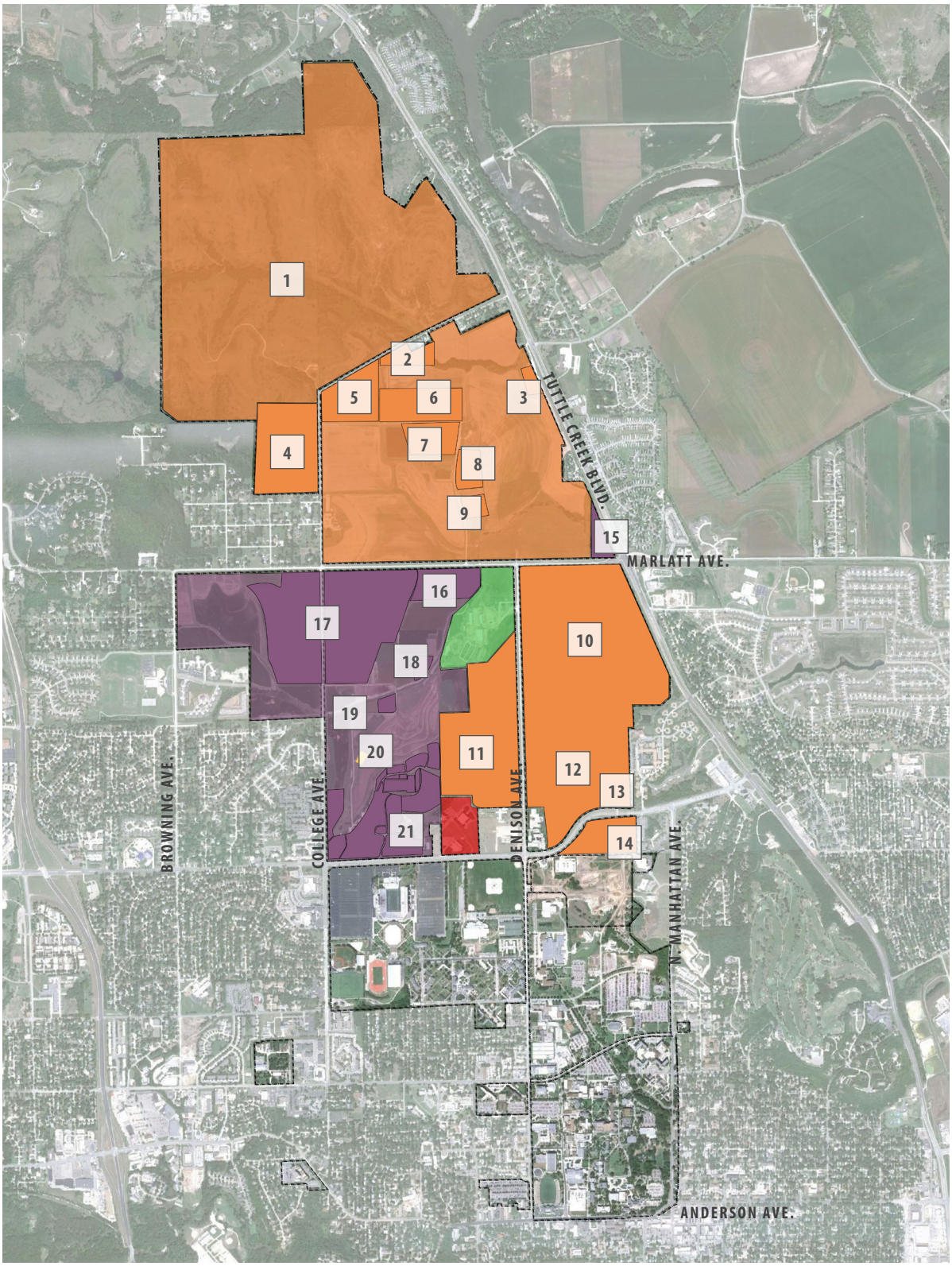
North Campus

The agricultural, veterinary, and research campus is a valuable asset of the Manhattan campus. It provides hands-on field and research opportunities for students and faculty in close proximity to the core campus. For students from more urban areas, the campus provides an opportunity to work with soil, plants, and animals for the first time. Few other land grant institutions have such easy access to these resources. The campus also provides extensive work-study opportunities for students, not all of whom are enrolled in Colleges of Agriculture or Veterinary Medicine programs. The Colleges of Agriculture and Veterinary Medicine, as well as the university at-large are interested in improving awareness of the rich diversity of activity and accomplishments supported by this zone of the campus.

NORTH CAMPUS ▶

- AGRONOMY
- GRAIN SCIENCE
- ANIMAL SCIENCE
- LARGE ANIMAL RESEARCH CENTER

1. PASTURE
2. LIVESTOCK MEAT & INDUSTRY COUNCIL
3. ARTIFICIAL BREEDING
4. EQUINE TEACHING & RESEARCH
5. BEEF CATTLE RESEARCH
6. SWINE
7. DAIRY TEACHING
8. DAIRY RESEARCH
9. POULTRY TEACHING & RESEARCH
10. PUREBRED BEEF TEACHING
11. SHEEP AND MEAT GOAT FACILITY
12. EQUINE EDUCATION
13. LIVESTOCK MARKETING
14. PUREBRED BEEF TEACHING
15. WEED SCIENCE
16. LONG-TERM CROP ROTATION STUDIES
17. LEARNING FARM
18. BIO-ENERGY
19. RESEARCH
20. COMPOST
21. EDUCATION DEMONSTRATION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TUTTLE CREEK BLVD.
MARLATT AVE.
BROWNING AVE.
COLLEGE AVE.
DENISON AVE.
MANHATTAN AVE.
ANDERSON AVE.

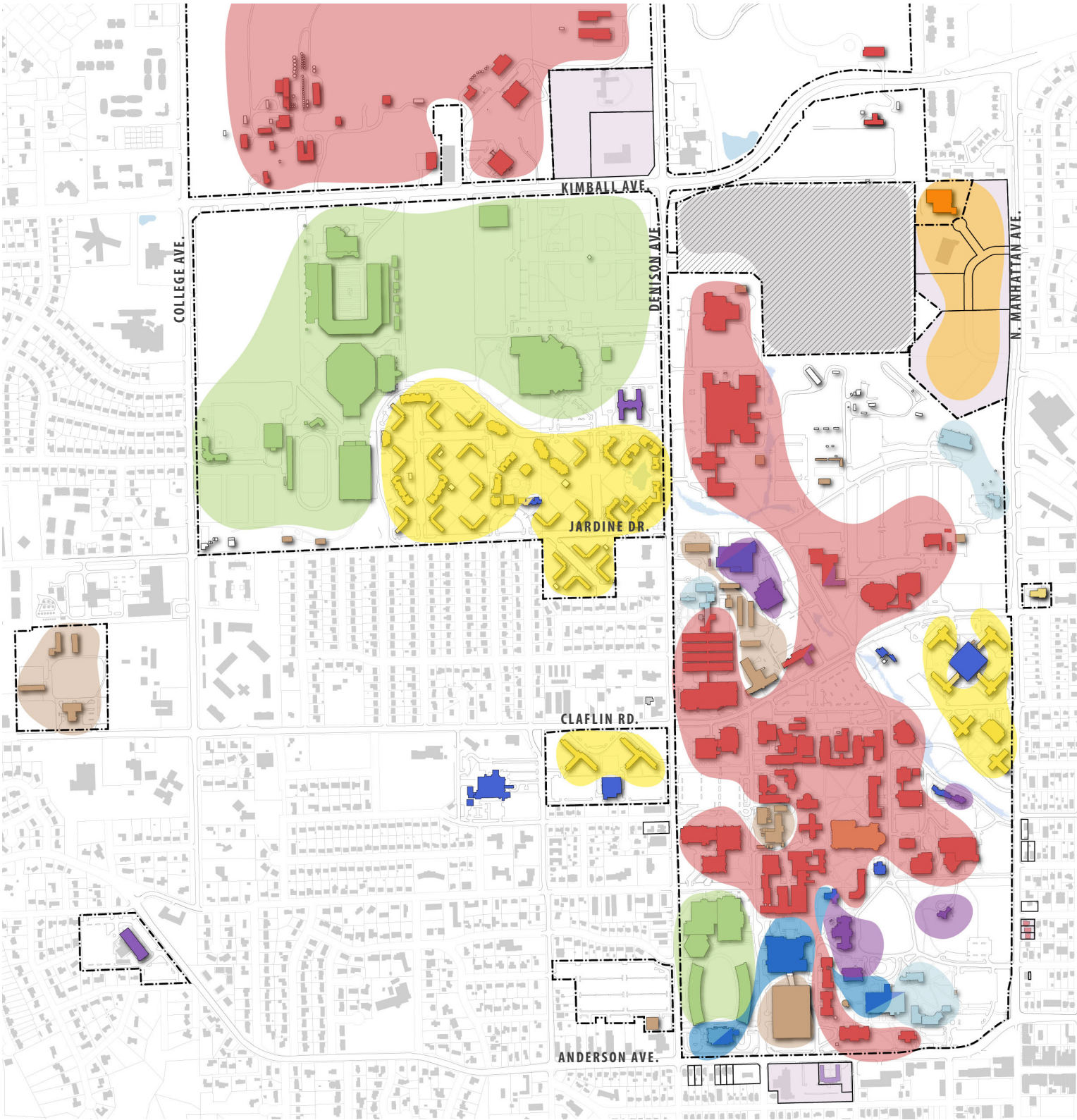
BUILDING AND LAND USE ARE CHARACTERIZED BY A CLOSE-KNIT MIX OF USES.

BUILDING AND LAND USE

In the core campus, building and land use are characterized by a close-knit mix of uses. A large academic area runs roughly north-south between North Manhattan and Denison Avenues. Clustered around the edges of this area are smaller zones of activity, including residential, support, and administrative, that support a vital campus experience. Athletics and recreation are clustered for the most part north of Claflin Road between Denison and College Avenues. A smaller zone of athletics and recreation activity is located at the northeast corner of Anderson and Denison Avenues.

BUILDING & LAND USE ▶

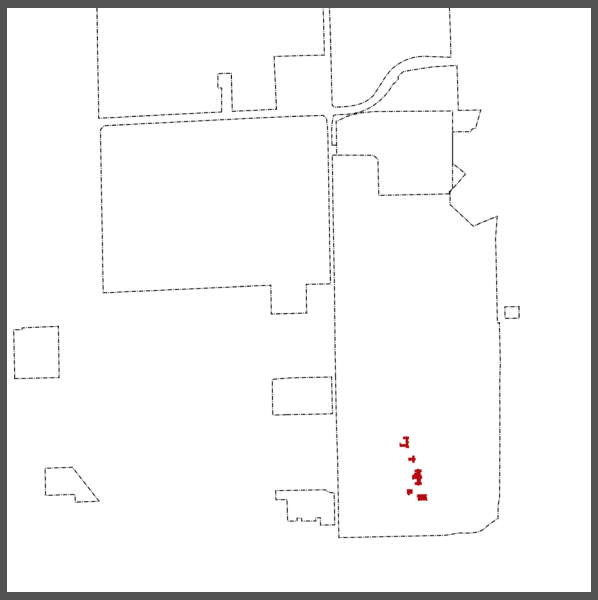
- ACADEMIC
- HOUSING
- STUDENT LIFE
- ATHLETICS & REC
- LIBRARY
- ADMINISTRATIVE
- PUBLIC USE
- RESEARCH
- FACILITIES


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.


WE WANT A
FIELD HOUSE

BUILDING AGE TELLS THE STORY OF THE DEVELOPMENT OF A CAMPUS. THE EVOLUTION OF THE MANHATTAN CAMPUS FOLLOWS LARGER TRENDS IN THE DEVELOPMENT OF AMERICAN COLLEGE AND UNIVERSITY CAMPUSES. GROWTH DURING THE FIRST ERA OF CAMPUS DEVELOPMENT WAS LIMITED AND ROUGHLY DOUBLED OVER THE NEXT 40 YEARS. CAMPUS DEVELOPMENT AND ENROLLMENT INCREASED BY ALMOST SIX TIMES IN THE YEARS AFTER WORLD WAR II, IN LARGE PART DUE TO THE INCENTIVES OF THE SERVICEMAN'S READJUSTMENT ACT OF 1944 OR G.I. BILL. ENROLLMENT GROWTH OVER THE PAST 30 YEARS HAS REMAINED STEADY, AT ABOUT 20 PERCENT, AND DEVELOPMENT OF NEW FACILITIES HAS SLOWED IN RESPONSE.

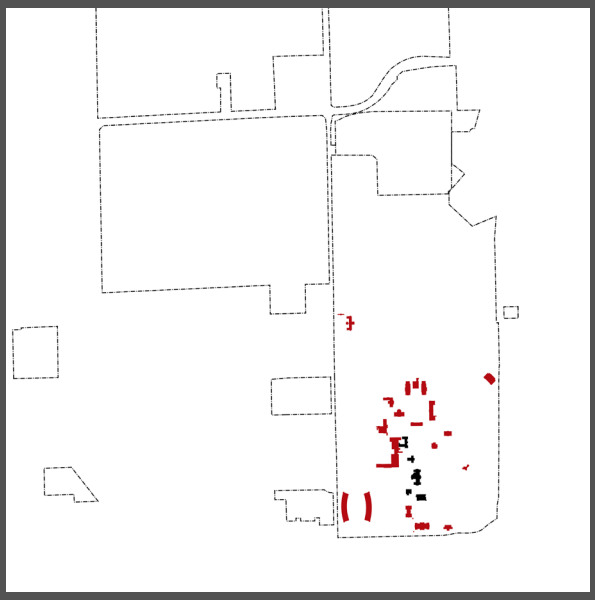
BUILDING AGE: 1859-1899



NEW BUILDING DURING PERIOD
EXISTING BUILDING

BLUEMONT CENTRAL COLLEGE, BUILT 1859 ▲

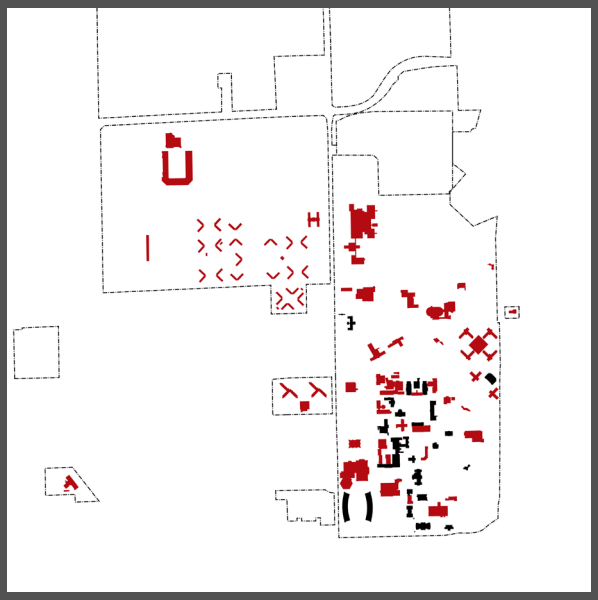
BUILDING AGE: 1900-1939



NEW BUILDING DURING PERIOD
EXISTING BUILDING

SEATON HALL, 1925 ▲

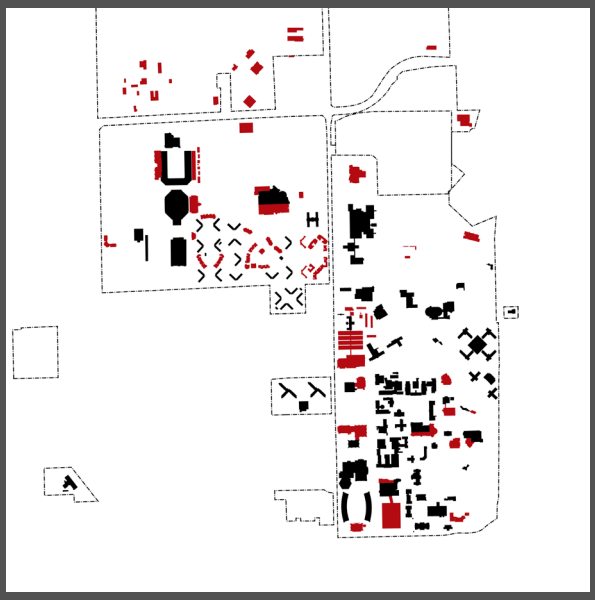
BUILDING AGE: 1940-1979



NEW BUILDING DURING PERIOD
EXISTING BUILDING

NICHOLS HALL, DECEMBER 1968 ▲

BUILDING AGE: 1980 – PRESENT



NEW BUILDING DURING PERIOD
EXISTING BUILDING

A RECENT VIEW OF THE MANHATTAN CAMPUS LOOKING NORTH FROM ANDERSON AVENUE ▲

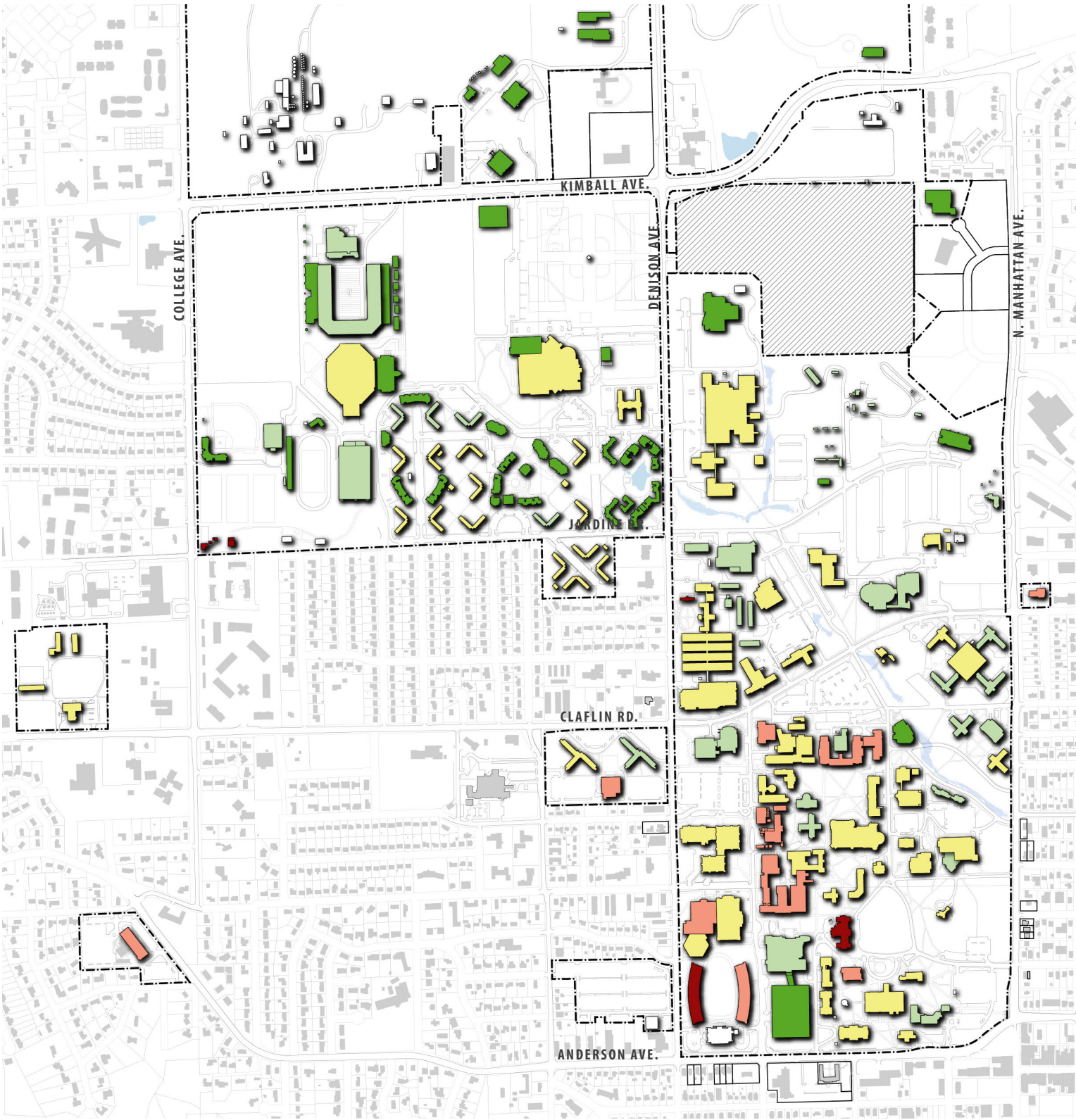
BUILDING CONDITION

Building condition was a common concern among many of the campus stakeholders that provided input to the planning process. This is not surprising in light of the fact that 50 percent of buildings on campus are more than 50 years old and 90 percent are more than 25 years old. These are critical age benchmarks in building life-cycle and as a result, many of the campus structures require renewal. Over the past seven years, the majority of capital improvement spending on existing facilities has been directed toward building envelope and mechanical projects. As a result, limited funding has been directed toward interior space and programming projects. This trend has negatively affected the quality of space on campus for university activities. For example, Sightlines' Fiscal Year 2011 Capitol Profile of K-State facilities reported that 59 percent of classrooms have only the most basic technology for instructors, such as desktop outlets to plug in a laptop and a projector with video, internet, and audio connections. To accommodate projected institutional growth, the university needs to devote considerable resources to the renewal of existing facilities.

BUILDING CONDITION* ▶

- EXCELLENT (C.V. = 90-100)
- GOOD (C.V. = 80-89)
- DEFICIENT (C.V. = 60-79)
- POOR (C.V. = 30-59)
- UNSATISFACTORY (C.V. = 0-29)

* Building Condition Value (C.V.) from Kansas Board of Regents Building Inventory


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.

CAMPUS GATEWAYS

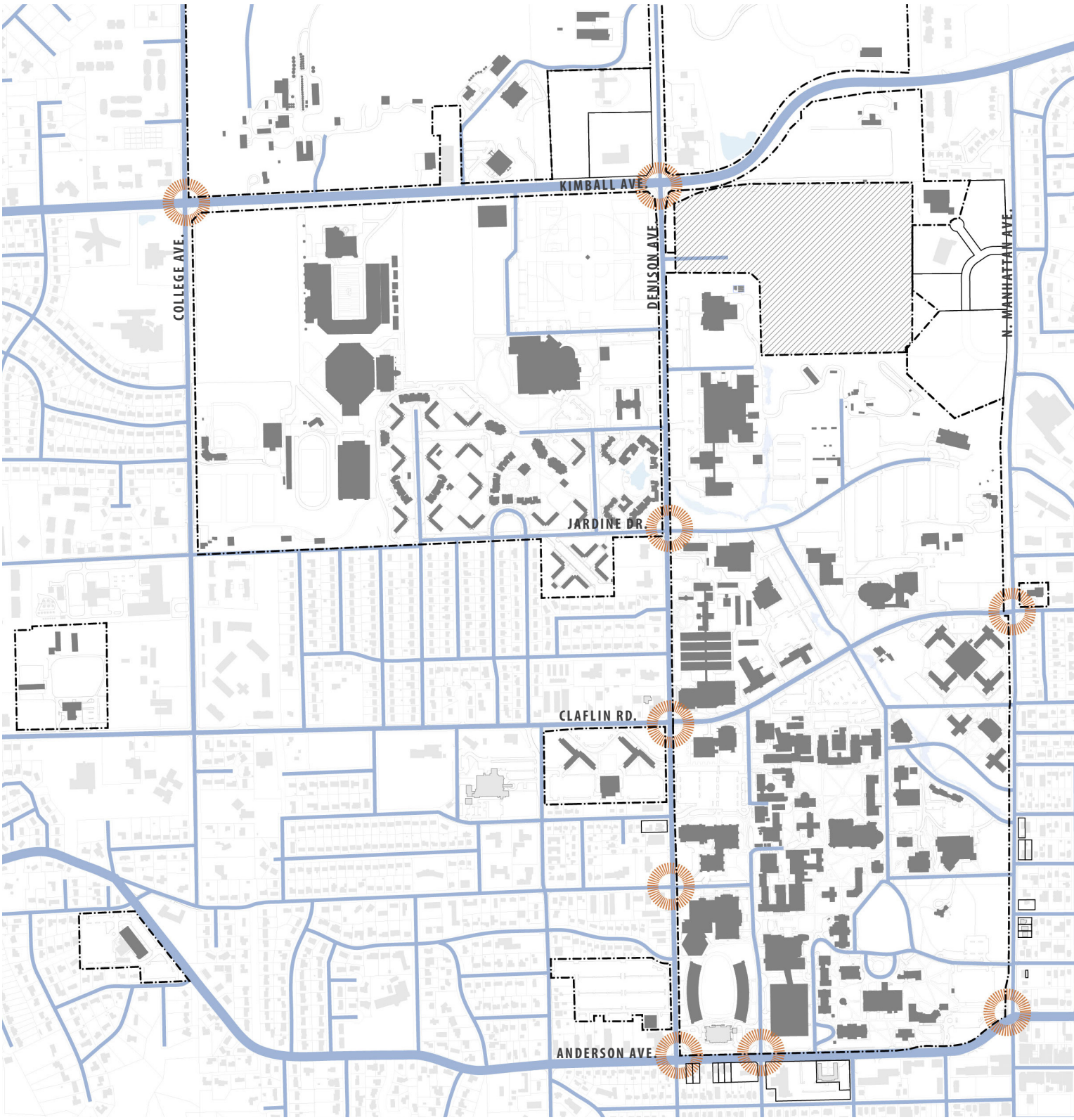
While K-State is an integral part of Manhattan, there are distinct points on the perimeter of campus that mark a visitor's arrival at the university. On the east side of campus, there is a gateway at the intersection of Claflin Road and North Manhattan Avenue. The most prominent gateway to the university is at the southeast corner of the campus at the intersection of North Manhattan, Anderson and Bluemont Avenues. There are also gateways at five other intersections:

- Anderson Avenue and 17th Street
- Denison Avenue and Claflin Road
- Denison Avenue and Jardine Drive
- Denison and Kimball Avenues
- Kimball and College Avenues

A number of these gateways are marked with signage or site walls. Ongoing maintenance and investment in campus gateways will enhance the appearance of the campus and make visitors feel welcome on arrival.

EXISTING CAMPUS GATEWAYS ▶

CAMPUS GATEWAY
ROAD NETWORK
EXISTING CAMPUS BUILDING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DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.

K-STATE'S CAMPUS IS PEDESTRIAN FRIENDLY; BICYCLING HAS GROWN IN POPULARITY.

TRANSPORTATION AND PARKING

Additional information can be found in the report prepared by Martin Alexiou Bryson.

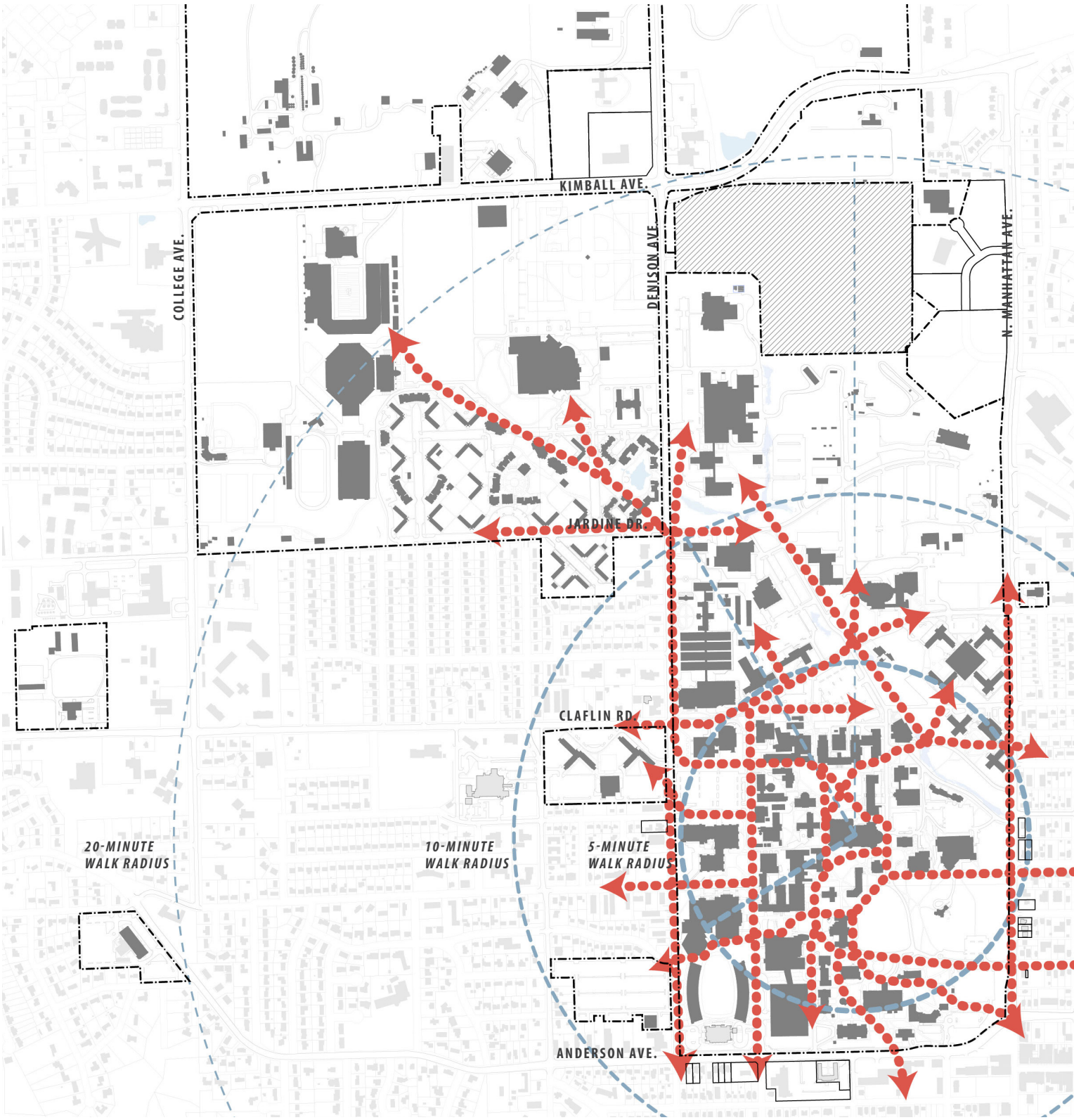
Pedestrian Circulation and Walk Times

Campus development patterns influence the desired pedestrian routes. There are a number of east-west movement patterns across the campus, as well as a strong northeast to southwest pattern of circulation. As a result of compact development of the campus and relatively flat terrain, K-State's campus is pedestrian friendly. In general, most academic facilities are located within an area with a radius of about a 10-minute walk. Hale Library has long been viewed as the center of this area.

Bicycle Circulation

Bicycling has grown in popularity recently; additional bicycling infrastructure would encourage this trend and improve safety. Many students and employees live near the campus and could cycle or walk to campus if conditions were improved. Through a university-city partnership, a bicycle improvements plan has been developed. Improvements are already being implemented and more are planned. On campus, the network of bike routes is not clearly differentiated from pedestrian routes, leading to confusion and conflicts.

PEDESTRIAN MOVEMENT PATTERNS ▶ PRIMARY PEDESTRIAN MOVEMENT

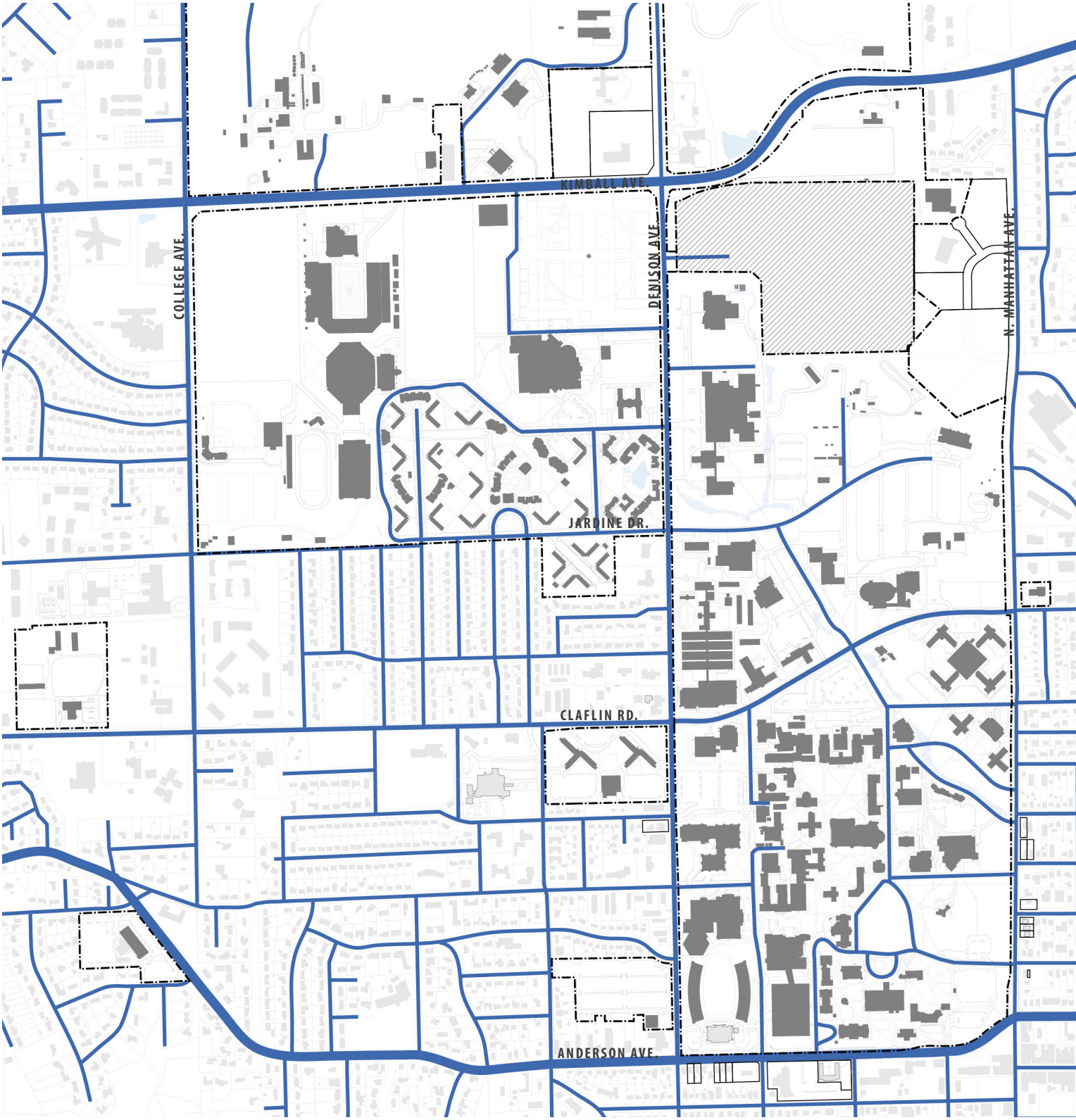

KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.
20-MINUTE WALK RADIUS
10-MINUTE WALK RADIUS
5-MINUTE WALK RADIUS

Automobile Circulation

Traffic conditions and access to the campus by car are not problematic, and municipal improvements are planned that will further enhance vehicular access. However, traffic on streets around the perimeter of the campus poses a safety hazard for pedestrians and cyclists.

VEHICULAR CIRCULATION ▶

ROAD NETWORK
EXISTING CAMPUS BUILDING


KIMBALL AVE.
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ANDERSON AVE.

Circulation Conflicts

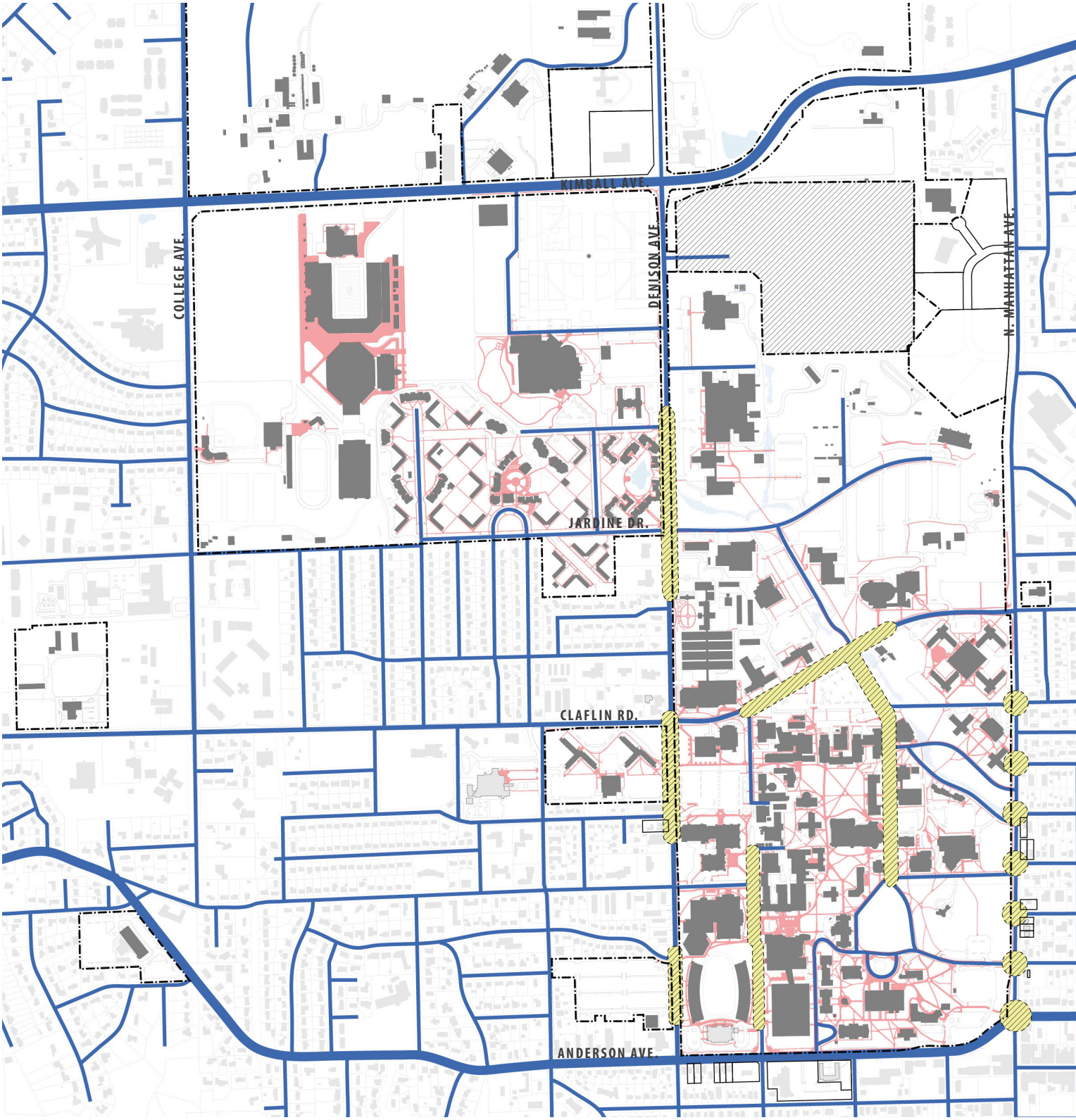
There are several areas on and around the campus where conflicts with vehicles are a safety hazard for pedestrians and cyclists. Some areas of concern are Claflin Road, particularly near Umberger Hall; Mid-Campus Drive, particularly near Hale Library; Denison Avenue near D1 Lot west of Memorial Stadium and the residential area south of Claflin Road; Anderson Avenue near Aggieville; and North Manhattan Avenue at most intersections with neighborhood streets to the east and campus roads to the west. In addition to safety improvements, restricting general traffic on some campus streets in conjunction with street closures or modifications would enhance the walkability of the campus.

Transit

Transit services on campus are funded through multiple sources with differing objectives, leading to some route duplication and inefficiencies. In April 2012, a city-wide transit service began that enables more of the university population to use transit to access the campus.

CIRCULATION CONFLICTS ▶

AUTO-PED CONFLICTS
PEDESTRIAN ROUTES
ROAD NETWORK
EXISTING CAMPUS BUILDING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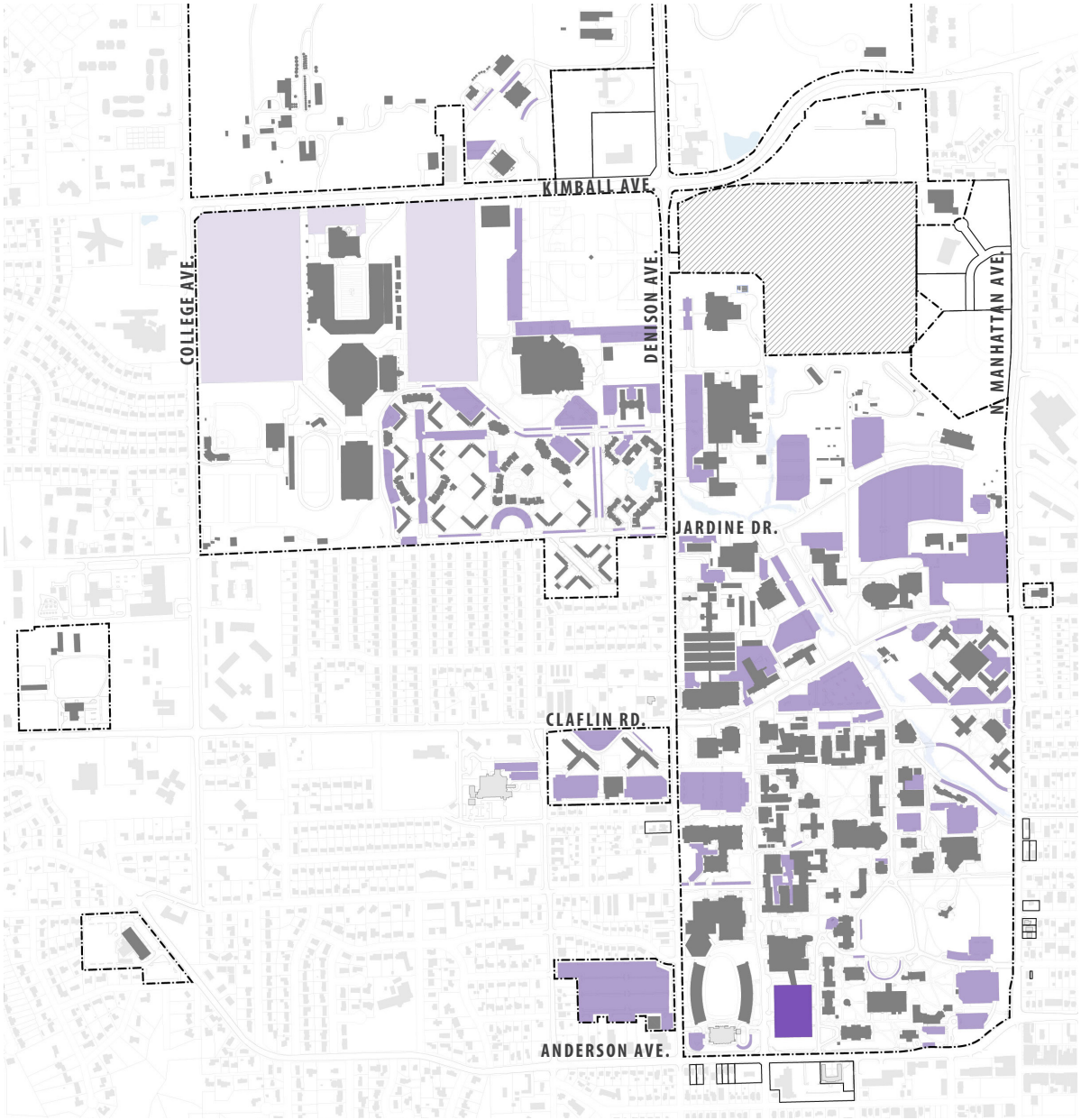
CLAFLIN RD.
ANDERSON AVE.

Parking

Surface parking is a significant land use on campus. If all surface parking on the campus was arranged contiguously it would cover about 145 acres of land or about 22 percent of the approximately 660 acres that comprise campus. The parking supply is adequate; however, access to convenient parking is strained. At the same time, there is a large amount of under-utilized surface parking in the lots adjacent to Snyder Family Stadium. Enhancements to the bicycle and pedestrian infrastructure and transit service, along with an effective Travel Demand Management program can improve access to this existing resource to address the demand for parking.



PARKING ◀

PARKING AGGREGATE ▼

- K-STATE STRUCTURED PARKING
- K-STATE SURFACE PARKING
- ATHLETICS SURFACE PARKING
- EXISTING CAMPUS BUILDING

IF ALL SURFACE PARKING ON CAMPUS WAS ARRANGED CONTIGUOUSLY, IT WOULD COVER ABOUT 145 ACRES OF LAND.

PLANNED PROJECTS ▼

Project	Project Total ASF	Project Total GSF
Funded or Under Construction		
Bill Snyder Family Stadium/Football Complex	9,700	78,815
Bill Snyder Family Stadium/Football Complex Phase II	199,340	212,000
Bramlage Coliseum	47,635	59,544
Agronomy Education Center	6,000	8,700
Memorial Stadium Welcome Center	29,860	34,700
Purple Masque Theatre in West Stadium	28,400	34,700
Equine Education Center	59,500	64,000
Justin Hall - Human Ecology	10,922	16,376
Chester E. Peters Rec Center	88,400	88,400
Engineering Complex Phase IV	51,500	80,000
Grain Science Center Feed Mill	10,647	19,044
Sheep and Meat Goat Center	20,305	58,294
TOTAL	**562,209**	**754,573**

ASF = Assignable Square Feet; GSF = Gross Square Feet

Utilization and Space Needs

Additional information can be found in the report prepared by Paulien and Associates.

The work completed included academic space utilization, base year (2011) space needs analysis, and target year (2025) space needs analysis. All analyses focused exclusively on the facilities of the Manhattan Campus.

ACADEMIC SPACE UTILIZATION

Approximately 30% of the classrooms on campus are departmentally controlled. K-State's general use classrooms are better utilized than departmentally held classrooms. The 125 general use classrooms average 32 weekly room hours at 64% student station occupancy. The 51 departmentally controlled classrooms average 24 weekly room hours at 66% student station occupancy. Among all classrooms, the utilization analysis shows an average of 29 weekly room hours, which is below the guideline of 32 weekly room hours. When classrooms are scheduled, the seats are being filled at the guideline of 65% student station occupancy.

Teaching laboratories have an average utilization of 18 weekly room hours at 84% student station occupancy. The weekly room hours average is appropriate for an institution such as K-State.

Centrally managing a higher percentage of the university's classrooms as general use classrooms would improve utilization campus-wide; facilitate phased renewal and improvements to classroom spaces; and provide additional insight into what sizes and types of classrooms are most valuable to the campus inventory.

ENROLLMENT PROJECTIONS ▼

College	Fall 2011	% Growth	No. of Students	Target Year**
College of Agriculture	2,575	15%	386	2,961
College of Architecture, Planning and Design	722	8%	58	780
College of Arts & Sciences	7,433	10%	743	8,176
College of Business Administration	2,562	13%	333	2,895
College of Education	1,647	0%	0	1,647
College of Engineering	3,367	21%	700	4,067
College of Human Ecology	2,005	10%	201	2,206
College of Veterinary Medicine	526	11%	58	584
Projected University Growth	**20,837**	**12%**	**2,479**	**23,316**

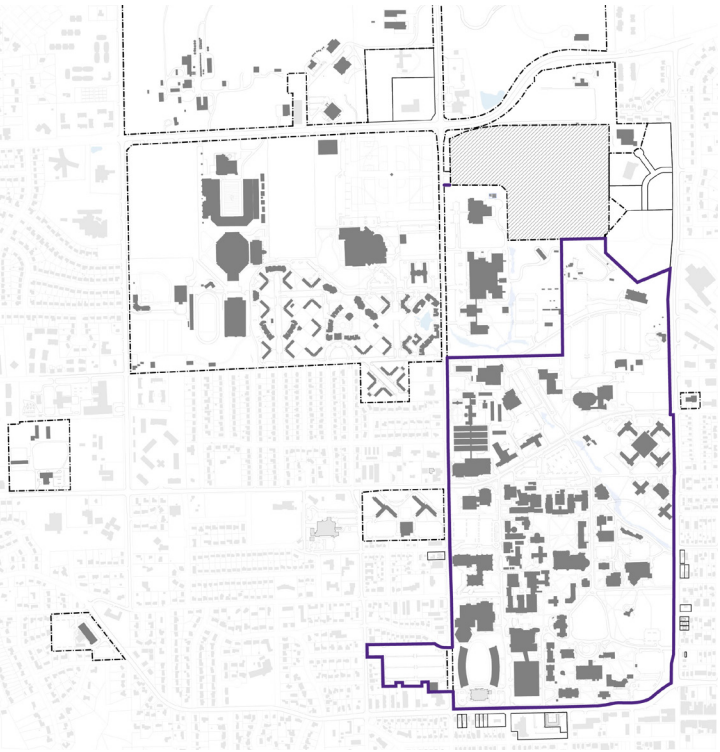
* Data and percentages provided by Kansas State University; approved by Provost 7/25/12
** Target Year is 2025

BASE YEAR AND TARGET YEAR SPACE NEEDS ANALYSIS

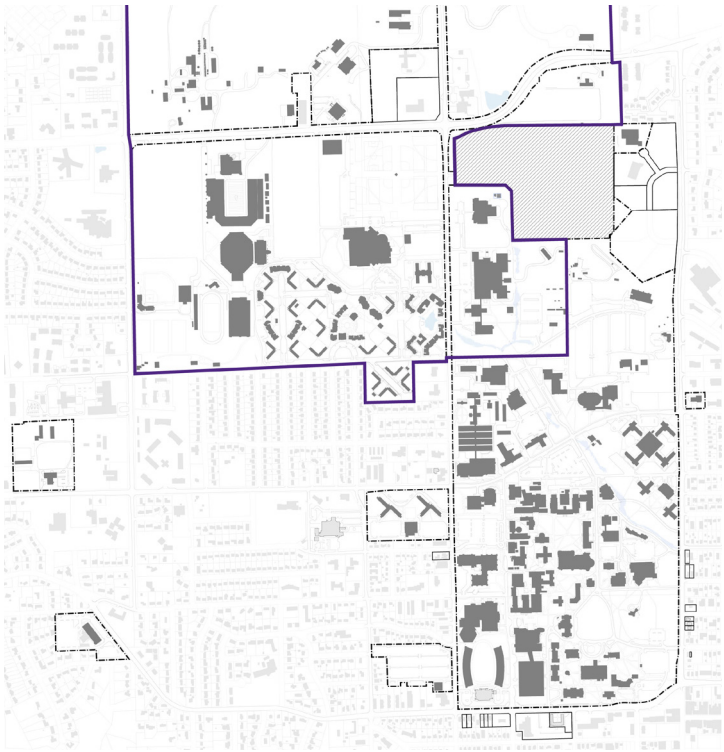
The method of determining space needs analysis is based on the institution's data, the strategic goals of the university, as well as understanding of best practices, relevant guidelines, and appropriate institutional comparatives from previous work. K-State provided institutional data related to facilities, course, staffing, current and project student enrollments, and research expenditures.

K-State has funded or under construction facilities that will affect the amount of existing space at the target year. These projects were included in the space needs analysis.

The base year analysis shows the amount and types of space needed at an enrollment of 20,837 headcount of on-campus students. The target year (2025) is aligned with the K-State's Strategic Plan (*K-State 2025: A Visionary Plan for Kansas State University*). The projected enrollment at the target year is 23,316 headcount of on-campus students, which is a 12% increase over the fall 2011 student headcount. Projections are shown by College on the table, Enrollment Projections.



▲ CORE BOUNDARY



▲ OUTER CORE BOUNDARY

The space needs analysis is organized in two groups. The first is "Core Academic Space", which are colleges or space types that are central to the University. The second is "Other", which includes all other Manhattan-based colleges or space types. These groupings were determined through discussion with K-State. The following graphics shows the geographical relationship to this method of organization. The "Core Academic Space" is shown on the left and "Other" is shown on the right.

The largest deficit of space is in the research space category. *K-State 2025* includes the visionary goal that the university will be recognized nationally as a Top 50 Public Research University. K-State's research expenditures in FY 2011 were almost $125 million. The most recently available National Science Foundation rankings show the #50 institution to be at $262 million. The University will need to increase research significantly to achieve a Top 50 ranking. There is a current (base year) deficit of 108,000 assignable square feet (ASF) and a target year deficit of over 850,000 ASF, which is split among "Research in the Core", the College of Veterinary Medicine (includes the College's research space), and "Research outside the Core (except Vet Med)". While the need for additional research space is tied in part to academic programs, this need is even more closely connected to funding. The rate at which new research space will be developed will depend on availability of outside funding from federal agencies and other sources.

CAMPUSWIDE SPACE NEEDS ANALYSIS

	2011 Student Headcount = 20,837 Staffing FTE = 5,132			Target Year Student Headcount = 23,316 Staffing FTE = 5,642			
SPACE CATEGORY	Existing ASF	Guideline ASF	Surplus / (Deficit)	Planned Projects	Existing ASF	Guideline ASF	Surplus / (Deficit)
Core Academic Space	**2,077,746**	**2,287,028**	**(209,282)**	**104,065**	**2,181,811**	**2,762,671**	**(580,860)**
Classrooms & Service	170,932	160,518	10,414	21,984	192,916	178,403	14,513
Teaching Laboratories & Service	166,658	261,125	(94,467)	11,350	178,008	285,596	(107,588)
Open Laboratories & Service	243,556	262,259	(18,703)	0	243,556	293,534	(49,978)
Library/Study/Collaborative Learning Space	257,908	286,388	(28,480)	0	257,908	301,327	(43,419)
Academic Offices & Service	643,017	697,300	(54,283)	26,292	669,309	756,295	(86,986)
Assembly & Exhibit (excluding Equine Center)	44,650	53,888	(9,238)	21,791	66,441	100,369	(33,928)
Other Academic Space	200,744	231,592	(30,848)	12,898	213,642	266,456	(52,814)
Research in the Core	350,281	333,959	16,322	9,750	360,031	580,690	(220,659)
Other	**1,500,254**	**2,158,971**	**(658,717)**	**458,144**	**1,958,398**	**2,946,748**	**(988,350)**
College of Veterinary Medicine (all space)	239,281	386,935	(147,654)	0	239,281	572,777	(333,496)
Administrative Offices & Service	147,811	183,270	(35,459)	34,580	182,391	191,810	(9,419)
Assembly & Exhibit (Equine Center)	56,805	68,584	(11,779)	56,029	112,834	127,743	(14,909)
Research outside the Core (except Vet Med)	191,763	240,180	(48,417)	18,300	210,063	621,350	(411,287)
Other Administrative Space	26,074	41,674	(15,600)	0	26,074	46,632	(20,558)
Athletics	392,659	654,794	(262,135)	262,135	654,794	654,794	0
Student Recreation & Kinesiology	178,350	219,424	(41,074)	87,100	265,450	246,859	18,591
Student Union	151,547	187,533	(35,986)	0	151,547	209,844	(58,297)
Physical Plant	115,964	176,576	(60,612)	0	115,964	274,940	(158,976)
CAMPUS TOTAL	**3,578,000**	**4,445,999**	**(867,999)**	**562,209**	**4,140,209**	**5,709,419**	**(1,569,210)**
Inactive/Conversion Space	*61,065*						
Outside Organizations	*3,249*						

THE DISCOVERY AND GOAL SETTING PHASE OF THE PLANNING PROCESS RESULTED IN A THOROUGH UNDERSTANDING OF THE CAMPUS.

DISCOVERY AND GOAL SETTING CONCLUSION

The intense research and analysis of the Discovery and Goal Setting phase of the planning process resulted in a thorough understanding of the physical character and ethos of the campus. Key findings from this effort informed the subsequent phases of the planning process and included:

- University mission and *K-State 2025: A Visionary Plan for Kansas State University* articulate K-State's research priorities and aspirations which will influence future development of the campus.
- As a land grant institution, K-State maintains a strong connection to its prairie setting in the Flint Hills. The campus landscape remains integral to both education and research, not just on the north campus, but also in the core. Care and respect for natural systems will continue to be of concern, especially management of campus water resources.
- Campus access – circulation and parking – has a significant presence in the built environment. Thoughtful and efficient enhancements will improve access for faculty, staff, students, and visitors and unlock potential capacity for new program space.
- On campus, the consistency of traditional architecture and building materials, and the

THE CAMPUS MASTER PLAN UPDATE MUST ADDRESS HOW FACILITIES AND GROUNDS CAN KEEP PACE WITH THE DEMANDS OF ACADEMICS AND RESEARCH.

pattern of development, particularly the balance of human-scale open space and buildings, creates a pedestrian-friendly experience. Maintenance, renewal, and enhancement of existing built resources will increase the functionality of the campus.

- Similarly, the campus's relationship with Manhattan and Aggieville are inherent to K-State's identity. The university will continue to work with municipal and neighborhood partners for the benefit of the community.
- Significant square footage in new facilities is required to support the university's visionary goal to be a Top 50 Public Research University. New facilities must not only meet program needs, but also contribute to the composition of the campus.

The Campus Master Plan Update must address how facilities and grounds can keep pace with the complex and significant demands of academics and research, while maintaining the aspects of campus life that define K-State.

CAMPUS ANALYSIS

THERE WERE RECURRING IDEAS AMONG MANY CONVERSATIONS WITH THE CAMPUS COMMUNITY. THESE IDEAS REPRESENT THE ESSENTIAL QUALITIES THAT DEFINE K-STATE AND ALSO REPRESENT ITS GREATEST OPPORTUNITIES.

CONCEPTUAL PLAN AND PLANNING PRINCIPLES

These ideas are captured in the Conceptual Plan and were a touchstone throughout the development of the Campus Master Plan. These ideas are also articulated in planning principles that guided the development of the Campus Master Plan. The Campus Master Plan Update should guide the physical development of the campus in a way that will:

Strengthen Identity

- Honor the unique landscape of the prairie.
- Build on K-State's relationship with the City of Manhattan.
- Respect the heritage and human-scale of the existing campus.

Leverage Program Adjacencies

- Optimize program adjacencies in the core and make wise use of campus edges and off-campus locations.
- Integrate academic and research activities in shared facilities.
- Cultivate spaces for intellectual and social collaboration.
- Improve utilization of existing space and technology.

Clarify Circulation

- Simplify circulation routes to improve safety for all modes.
- Promote alternatives to driving.
- Shift parking to the periphery from the core of campus.

Promote Sustainability

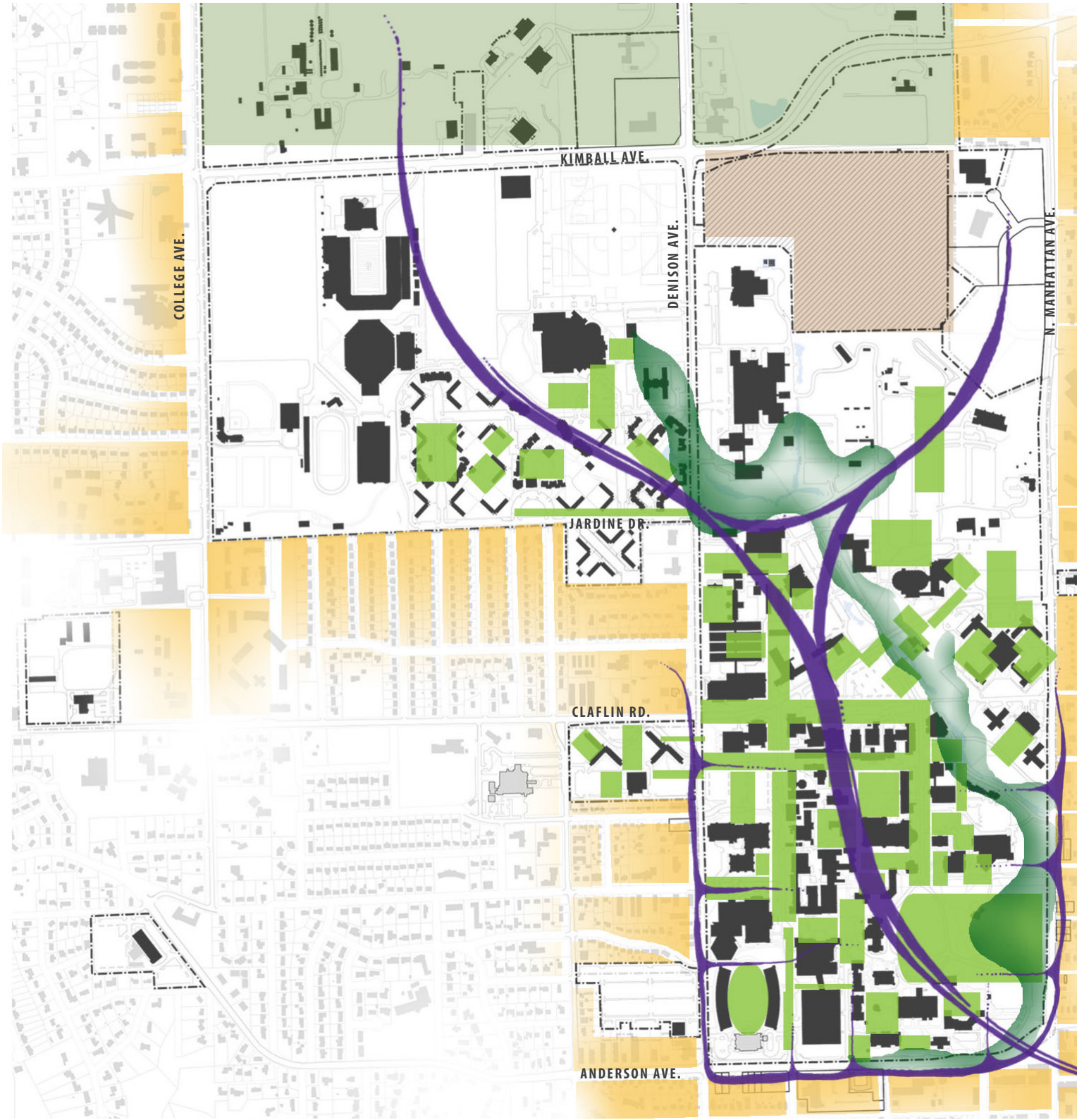
- Reduce water consumption of campus.
- Improve stormwater quality
- Improve the energy efficiency of existing and new buildings.
- Leverage investments in renovation or replacement facilities for maximum impact.

NEW DEVELOPMENT AND OPEN SPACE IMPROVEMENTS CAN ENHANCE PEDESTRIAN ACCESS AMONG ALL AREAS OF CAMPUS.

Based on the results of the Discovery phase of the planning process, the project team focused its creativity on two aspects of campus: parking and circulation and program location. A variety of parking and circulation options were considered in order to understand their practicality, as well as effects on mobility and accessibility for automobiles, bicycles, and pedestrians. It was agreed that the ideal solution should not only provide great utility and function, but also enhance the quality of campus life. Similarly, multiple options for organization of academic programs on campus were generated and evaluated.

CONCEPTUAL PLAN ▶

- PEDESTRIAN CONNECTIONS
- CAMPUS CREEK VALLEY
- HIGH-QUALITY OPEN SPACE
- AGRICULTURAL, VETERINARY MEDICINE, AND RESEARCH CAMPUS
- NBAF
- CAMPUS-COMMUNITY INTERFACE


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.

PARKING AND CIRCULATION

Parking and circulation support the day-to-day activities of faculty, staff, students, and visitors on campus. Providing these functions in a way that facilitates regular and convenient access, while enhancing the character of the campus is challenging. In response, the campus master plan recommends a series of modifications to the campus circulation network that will encourage cross-town traffic to move around the campus, rather than through it. Many of these ideas were proposed as part of the campus master planning process in 2004. The campus would continue to be served by public streets at its perimeter. Starting at Memorial Stadium and moving clockwise, perimeter streets will continue to be Denison Avenue to Claflin Road to College Avenue to Kimball Avenue to North Manhattan Avenue to Anderson Avenue back to Denison Avenue. Internal circulation on campus would be limited for daily users. In addition, key campus resources and destinations would be served by a series of access drives.

From North Manhattan Avenue:

- Lovers Lane
- Campus Creek Road
- Old Claflin Road

From Denison Avenue:

- College Heights Road

From Anderson Avenue:

- North Seventeenth Street
- Mid-Campus Drive

Service, handicapped, and emergency access are supplemented as-needed by controlled access of North 17th Street between the K-State Student Union and Claflin Road, as well as Mid-Campus Drive between Lovers Lane and Old Claflin Road.

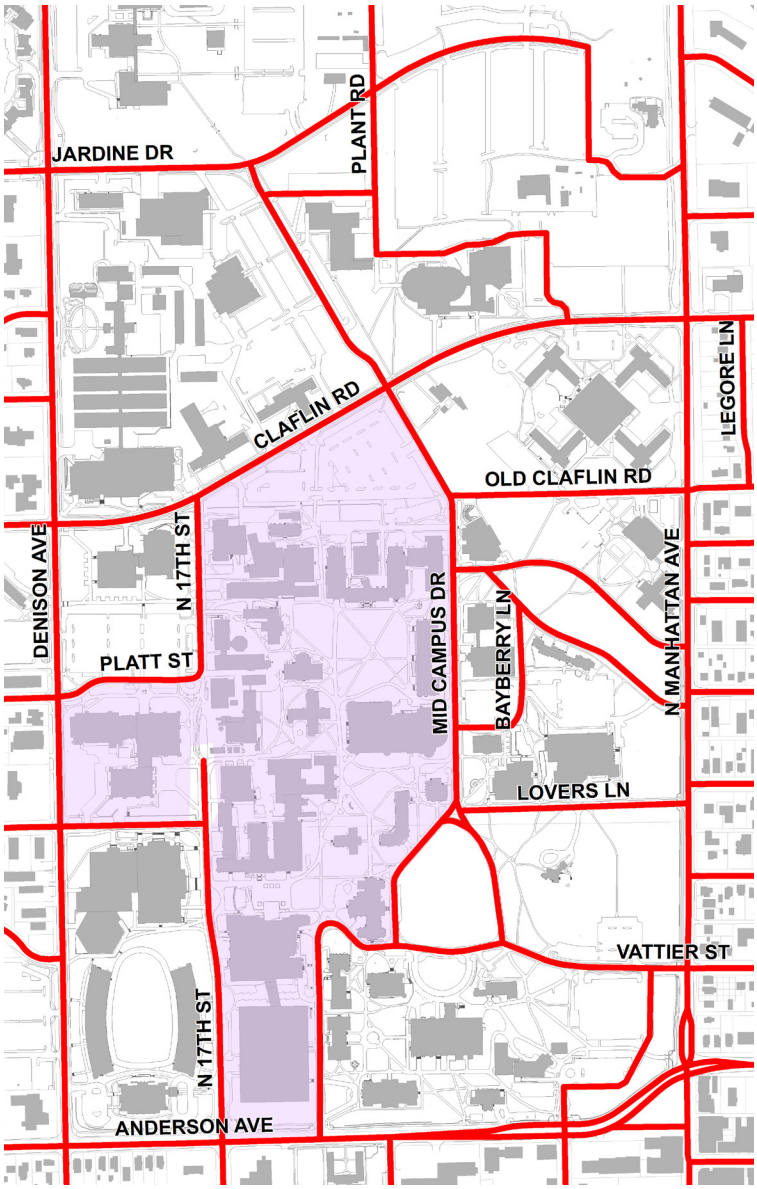
Additionally, the campus master plan recommends locating much of the surface parking for the campus in the large lots at Snyder Family Stadium and establishing regular and reliable transit service on campus. Consolidating parking in the area around the stadium makes transit to this area highly efficient. The transit that serves these parking resources also serves the campus at-large, thereby improving mobility for all faculty, staff, students, and visitors.

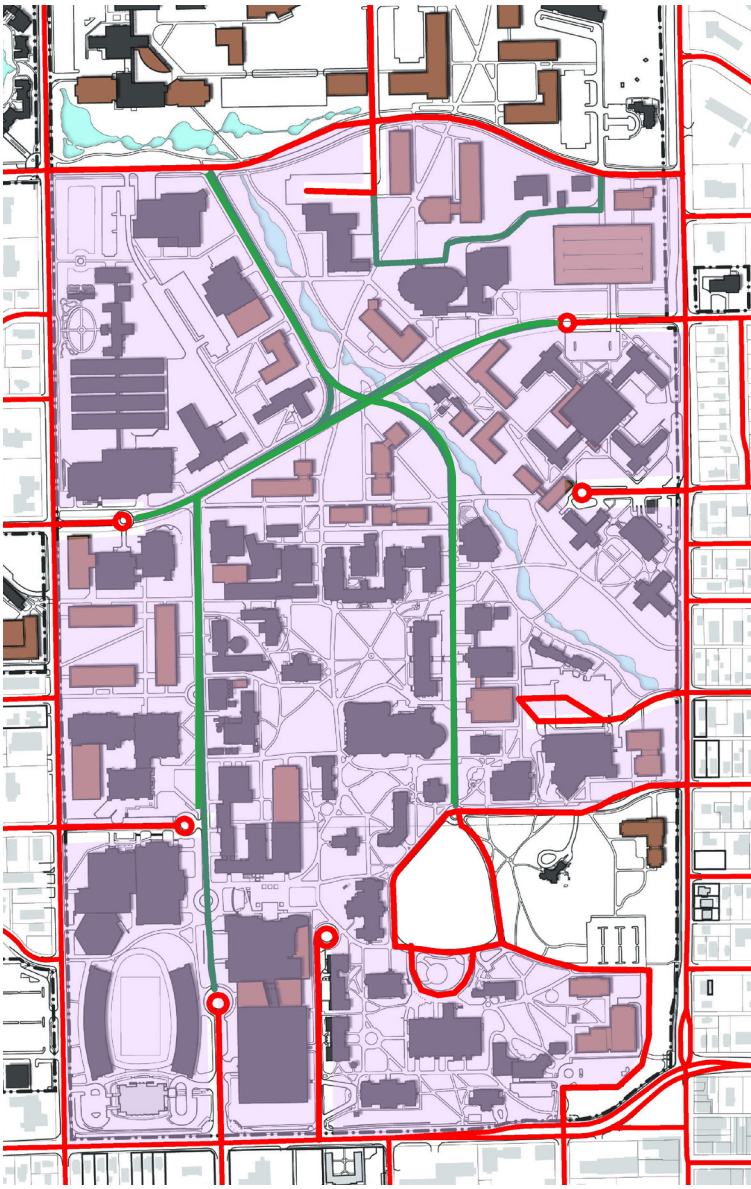
The proposed campus circulation prioritizes pedestrian movement and the beauty of the campus, while allowing for flexible management of traffic and access, as well as ongoing coordination with Manhattan-wide transit service.

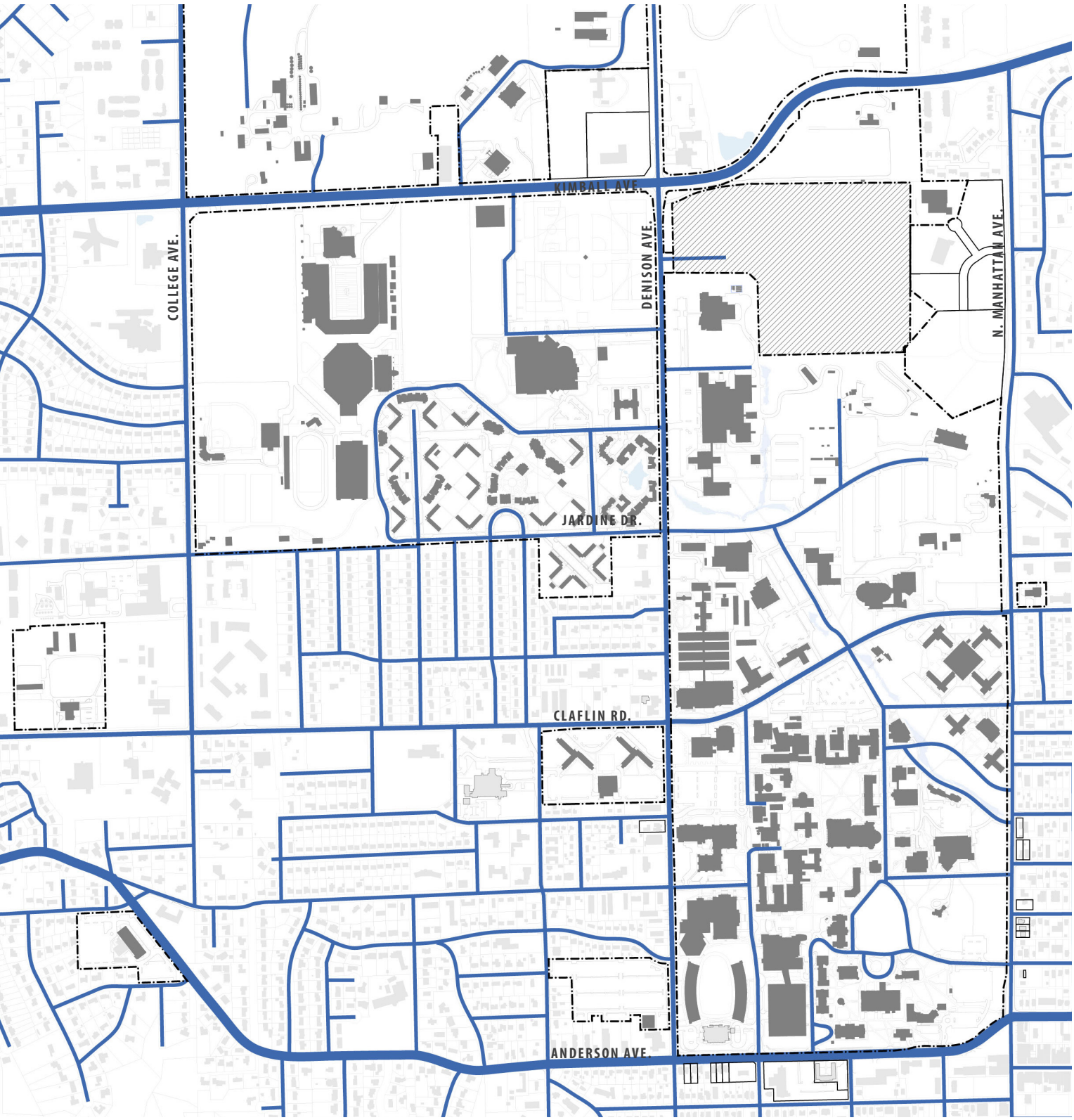
EXISTING PEDESTRIAN ZONE ▼

PROPOSED PEDESTRIAN ZONE ▼

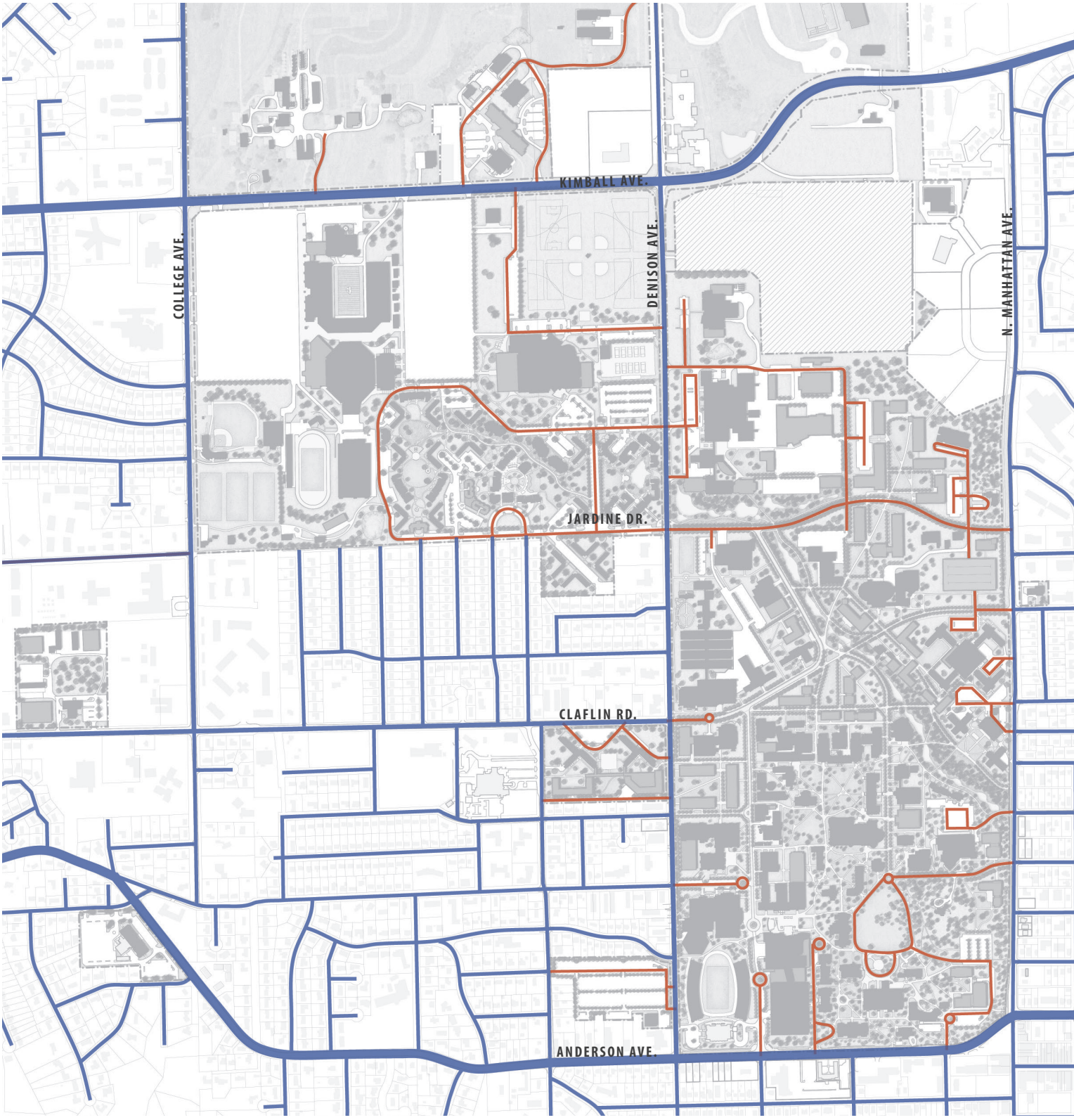
STREETS
PEDESTRIAN ZONE
LIMITED ACCESS DRIVES



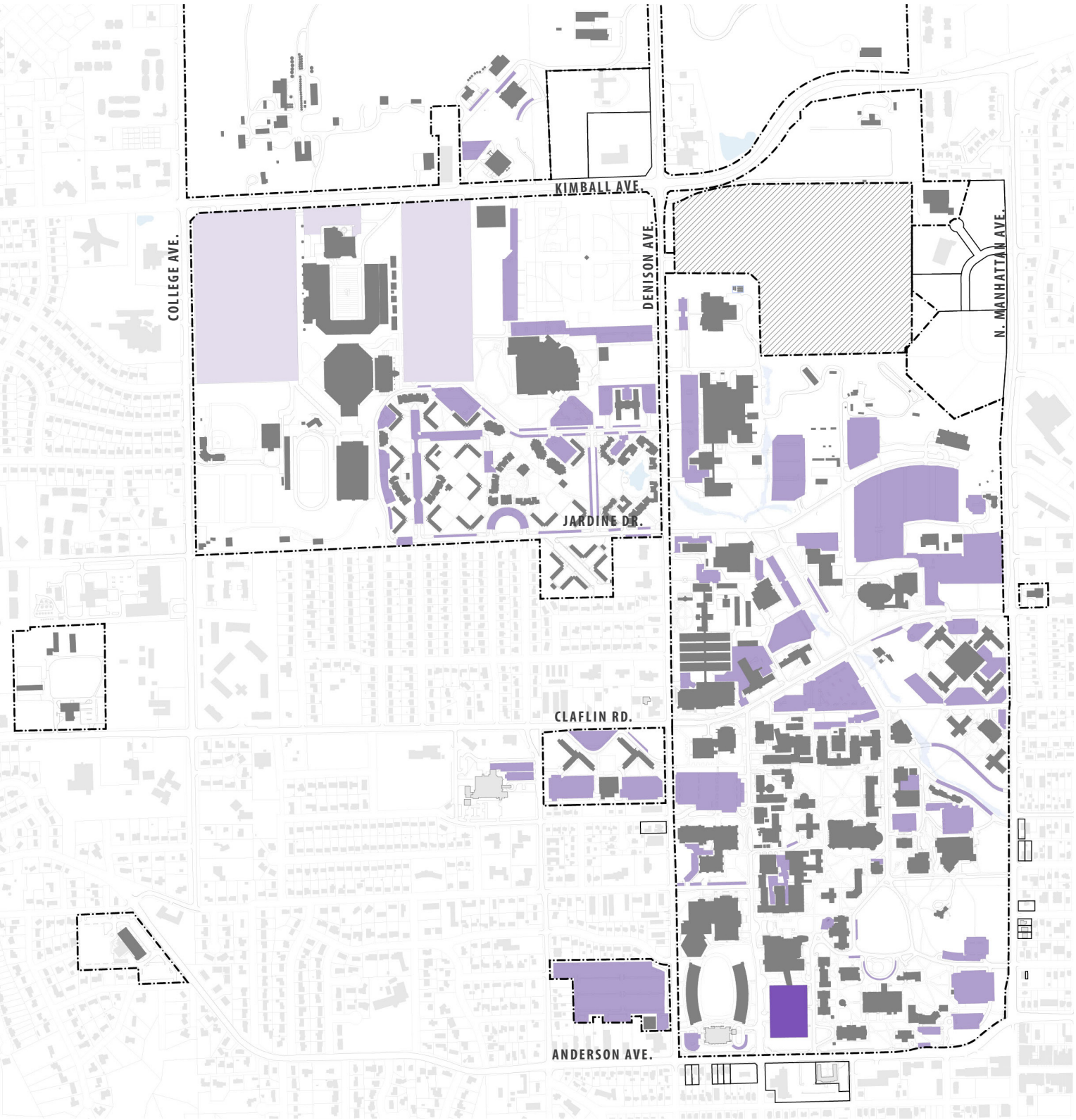




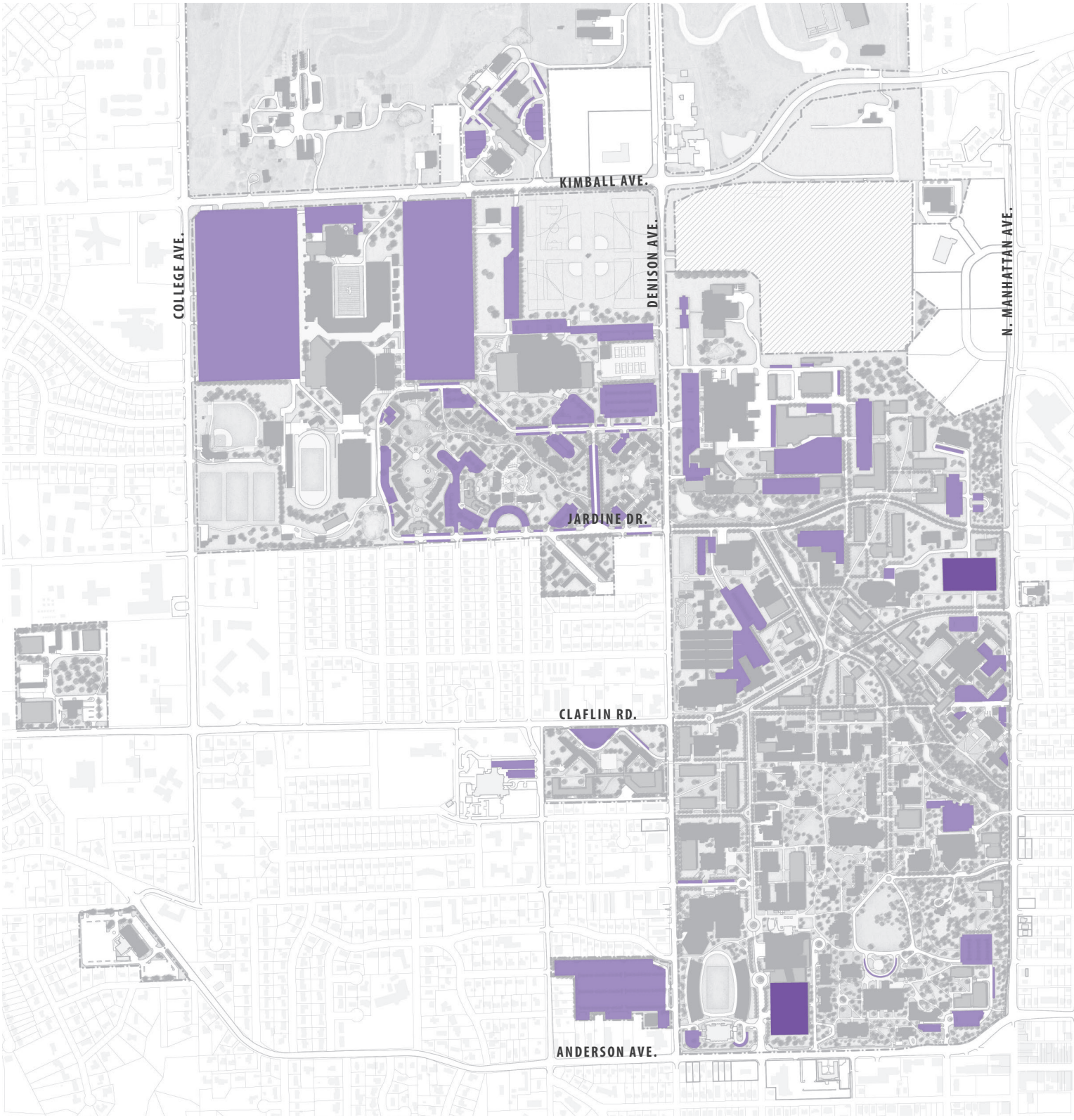
EXISTING VEHICULAR CIRCULATION ▲ ALL TRAFFIC EXISTING CAMPUS BUILDING



PROPOSED VEHICULAR CIRCULATION ▲ PUBLIC STREET CAMPUS STREET



EXISTING PARKING ▲ STRUCTURED PARKING SURFACE PARKING ATHLETICS SURFACE PARKING



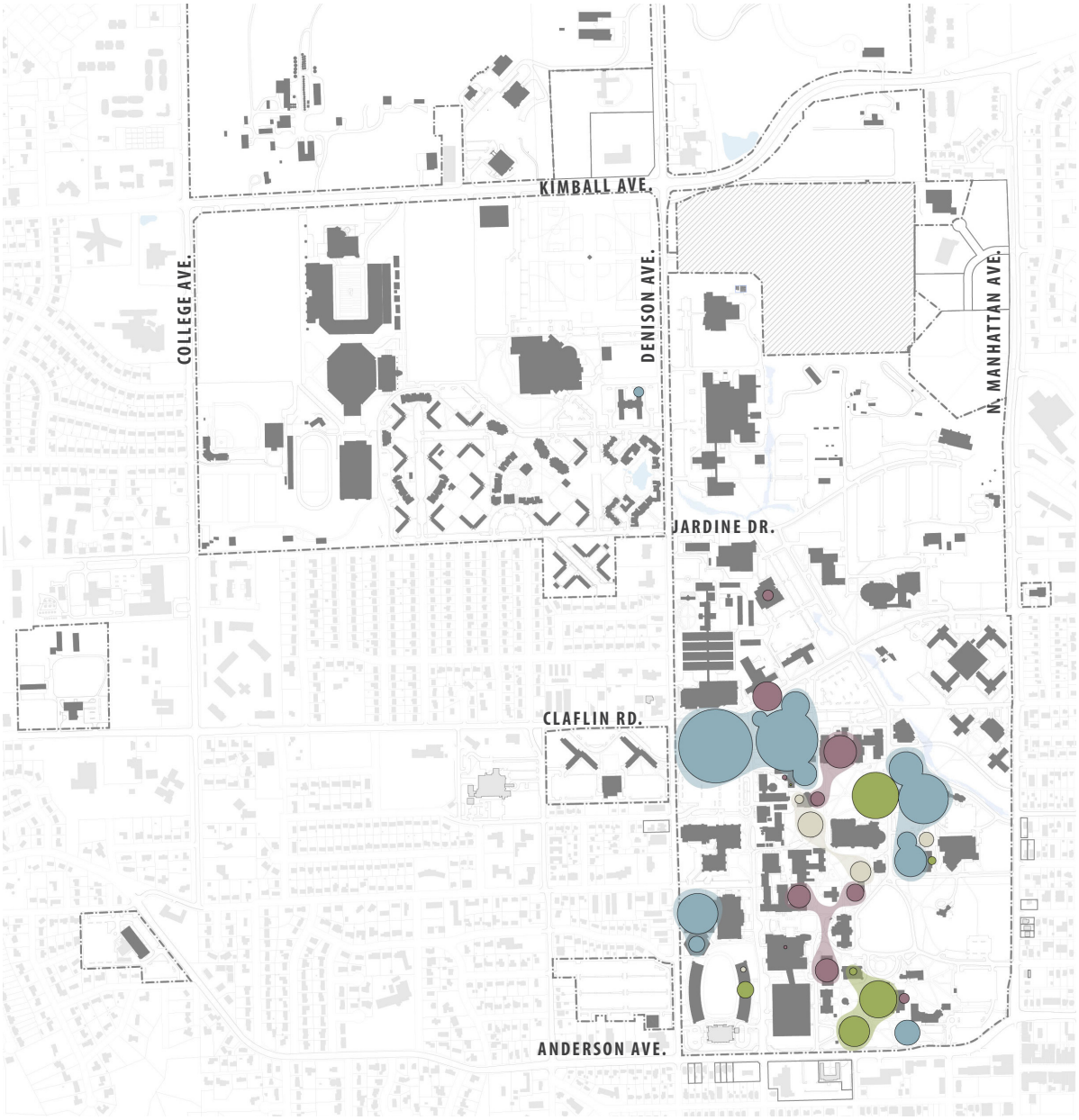
PROPOSED PARKING ▲ STRUCTURED PARKING SURFACE PARKING

PROGRAM LOCATION

Another aspect of campus organization that was carefully studied as part of the planning process was program location. Understanding where each of the Colleges is currently located on campus was a natural first step. Since the College of Arts and Sciences comprises such a wide-range of disciplines, its programs were divided into four categories – Humanities, Fine Arts, Social Sciences, and Sciences - and similarly mapped. This information suggests that new space for the College of Arts and Sciences should be organized around existing related activities to enhance physical adjacencies among programs. Using information about all of the colleges, two options to improve program adjacencies were developed. Both options improve the physical adjacencies among all of the Colleges and create flexibility that allows campus development to respond to program priority and availability of resources throughout implementation of the Campus Master Plan.

EXISTING SPACE ALLOCATION – COLLEGE OF ARTS & SCIENCES ▼

HUMANITIES
FINE ARTS
SOCIAL SCIENCES
SCIENCES



EXISTING SPACE ALLOCATION AND NEW SPACE NEEDS – COLLEGE OF ARTS & SCIENCES ▼

HUMANITIES
FINE ARTS
SOCIAL SCIENCES
SCIENCES
NEW SPACE NEEDS

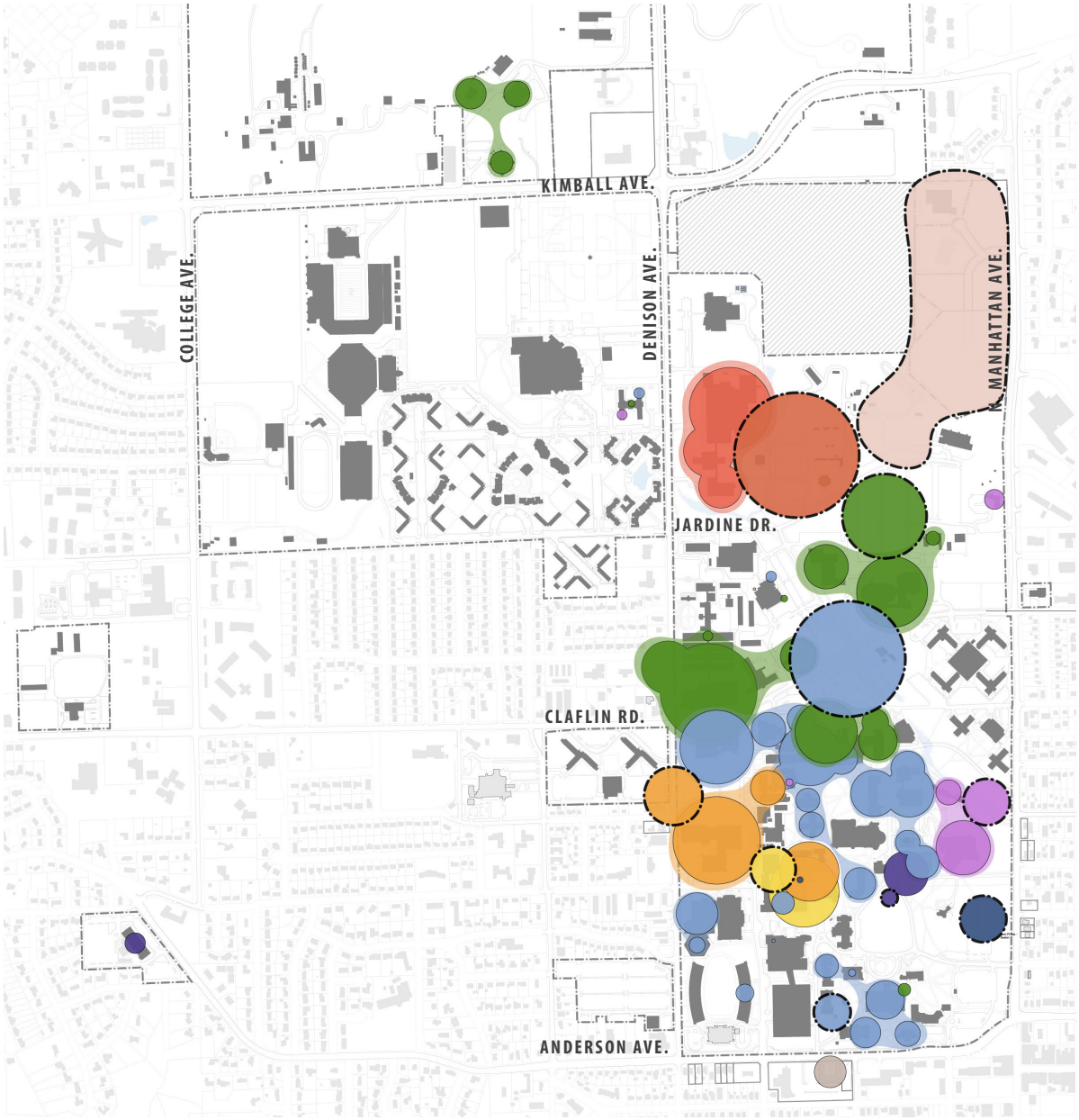
- 9,000 NEW ASF HUMANITIES
- 39.000 NEW ASF FINE ARTS
- 14,000 NEW ASF SOCIAL SCIENCES
- 207,000 NEW ASF SCIENCES

EXISTING SPACE ALLOCATION – ALL COLLEGES ▼

- COLLEGE OF AGRICULTURE
- COLLEGE OF ARTS AND SCIENCES
- COLLEGE OF ARCHITECTURE, PLANNING AND DESIGN
- COLLEGE OF BUSINESS ADMINISTRATION
- DIVISION OF CONTINUING EDUCATION
- COLLEGE OF EDUCATION
- COLLEGE OF ENGINEERING
- COLLEGE OF HUMAN ECOLOGY
- COLLEGE OF VETERINARY MEDICINE

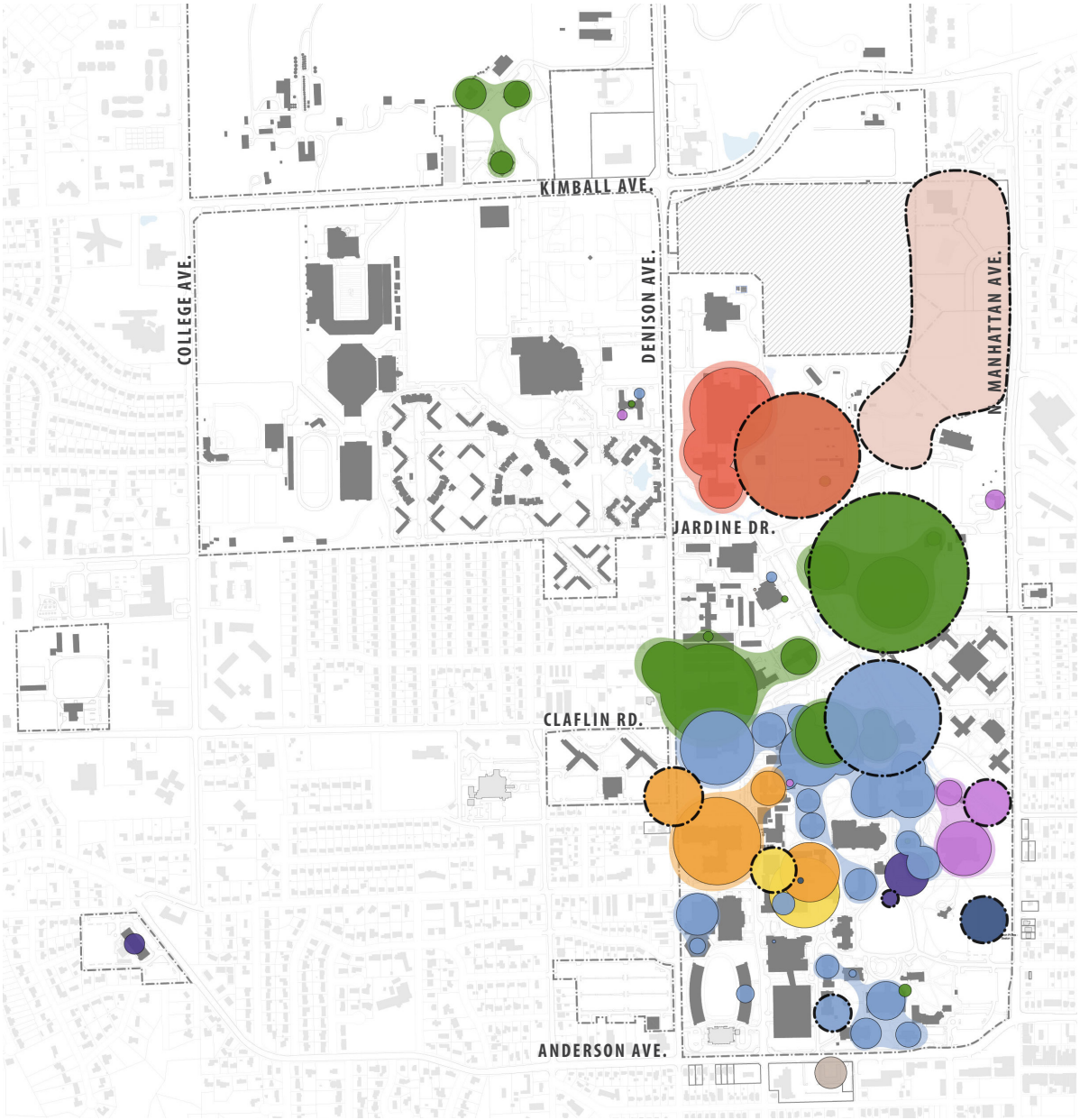
EXISTING SPACE ALLOCATION AND NEW SPACE NEEDS – ALL COLLEGES

OPTIONS TO ENHANCE PROGRAM ADJACENCY DIFFER IN THE STRATEGY TO ACCOMMODATE GROWTH IN THE COLLEGE OF ARTS AND SCIENCES AND THE COLLEGE OF AGRICULTURE. THIS FLEXIBILITY ALLOWS CAMPUS DEVELOPMENT TO RESPOND TO PROGRAM PRIORITY AND AVAILABILITY OF RESOURCES THROUGHOUT IMPLEMENTATION OF THE CAMPUS MASTER PLAN.



EXISTING SPACE ALLOCATION AND NEW SPACE NEEDS – ALL COLLEGES

- RESEARCH ACTIVITY
- COLLEGE OF AGRICULTURE (140,000 NEW ASF)
- COLLEGE OF ARTS AND SCIENCES (269,000 NEW ASF)
- COLLEGE OF ARCHITECTURE, PLANNING AND DESIGN (45,000 NEW ASF)
- COLLEGE OF BUSINESS ADMINISTRATION
- DIVISION OF CONTINUING EDUCATION
- COLLEGE OF EDUCATION (8,000 NEW ASF)
- COLLEGE OF ENGINEERING (60,000 NEW ASF)
- COLLEGE OF HUMAN ECOLOGY (45,000 NEW ASF)
- COLLEGE OF VETERINARY MEDICINE (333,000 NEW ASF)
- NEW SPACE NEEDS



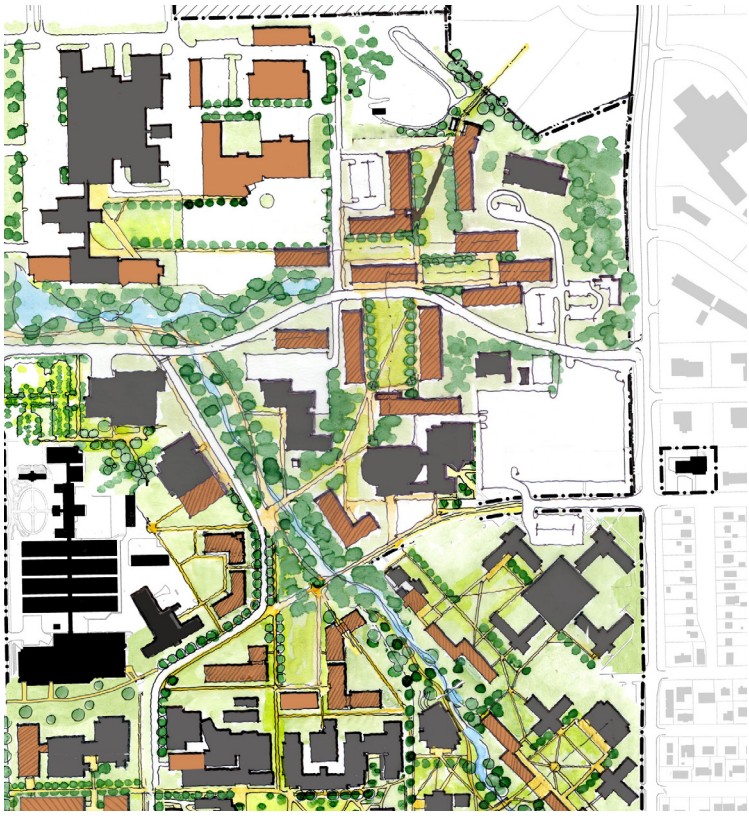
IDEA GENERATION

STRONG CAMPUS PLANS BALANCE THE VISIONARY AND REALISTIC. WITHOUT VISION, A PLAN WILL NOT INSPIRE; WITHOUT REALISM, IT CANNOT BE IMPLEMENTED.

Focused studies of small areas of the campus were used to test the vision established by the Conceptual Plan. Using the information and analysis of previous phases, the project team, the Campus Master Plan Update Task Force, and other campus stakeholders (see Acknowledgements) worked together to create a vision for where the campus could provide the facilities to support the visionary goal of *K-State 2025*. Ideas for new buildings and open space prompted lively discussion. While the campus core affords numerous sites for infill and incremental program growth, there is opportunity for significant new development to the north and east of Waters Hall. These workshops allowed for open discussion of the pros and cons of a variety of ideas. Old and new ideas were considered, and the group's collective creativity is evident in the resulting plan.

THESE DRAWINGS SHOW PLANNING IDEAS THAT WERE CONSIDERED FOR THE AREA NORTH OF WATERS HALL; VARIATIONS ON THE ALIGNMENTS OF CLAFLIN ROAD AND JARDINE DRIVE, AS WELL AS THE DEVELOPMENT PATTERN OF NEW FACILITIES WERE EVALUATED.

EXISTING CAMPUS BUILDING
PROPOSED CAMPUS BUILDING
NBAF
KSU CAMPUS BOUNDARY
KSU FOUNDATION PROPERTY



THE KANSAS STATE UNIVERSITY CAMPUS MASTER PLAN UPDATE ADDRESSES WHERE THE MANHATTAN CAMPUS CAN PROVIDE THE FACILITIES NECESSARY FOR THE UNIVERSITY TO ACHIEVE ITS VISIONARY GOAL TO BE A TOP 50 PUBLIC RESEARCH UNIVERSITY BY 2025. IN FACT, THE CAMPUS MASTER PLAN UPDATE IDENTIFIES CAMPUS DEVELOPMENT POTENTIAL THAT EXCEEDS THE DEMANDS OF *K-STATE 2025*. NOT ONLY WILL THE ENVISIONED IMPROVEMENTS ADVANCE THE GOALS OF THE STRATEGIC PLAN, BUT THEY WILL ALSO ENHANCE THE EXPERIENCE OF STUDENTS, FACULTY, STAFF, AND VISITORS TO THE CAMPUS.

ENHANCEMENTS TO THE PHYSICAL CAMPUS

The Campus Master Plan proposes a variety of improvements that would enhance physical facilities for academic and research activity on campus. While the projects are not in any sequential order of development, this comprehensive list includes near- and long-term projects.

Academic and Research Facilities

A - F. See *Campus Life,* page 94

G. Expansion of Ackert Hall provides new space for academic programs.

H. A new quadrangle provides additional space for academic programs, likely the sciences, and expands the open space network to better connect Kramer Complex to the core campus.

I. Expansion of the College of Engineering complex supports the State of Kansas University Engineering Initiative Act.

J. Expansion and renovation of Seaton Hall provides new academic program space.

K. *See Campus Life,* page 94

L. New construction as recommended by the College of Veterinary Medicine Master Plan expands the College; campus open space network enhancements expand the KSU Gardens north of Jardine Drive.

M. New construction between Umberger and Dole Halls provides new space for academic programs.

N. Expansion of Cardwell Hall provides new space for academic programs.

O. A new quadrangle North of Jardine Drive provides additional program space, likely research activity, and improves connectivity among the College of Veterinary Medicine, the K-State Research Park, and the core campus.

P. A new quadrangle south of Jardine Drive provides additional program space, likely research activity, and expands the campus open space network to improve north-south connectivity.

Q. New construction provides additional space for academic programs or research activity with views of a rejuvenated Campus Creek.

R. A new quadrangle provides additional space for academic programs, likely the College of Arts and Sciences or Agriculture, and expands the campus open space network to improve north-south connectivity.

S. New construction north of Waters Hall provides additional space for academic programs; likely a general classroom building.

T. Expansion of the International Student Center provides additional square footage for the program with views of a rejuvenated Campus Creek.

U. New construction south of Jardine Drive, adjacent to North Manhattan, provides additional space for academic programs.

V. See *Campus Life,* page 94

W. See *Campus Life,* page 94

X. New construction north of Dickens Hall provides additional space for academic programs.

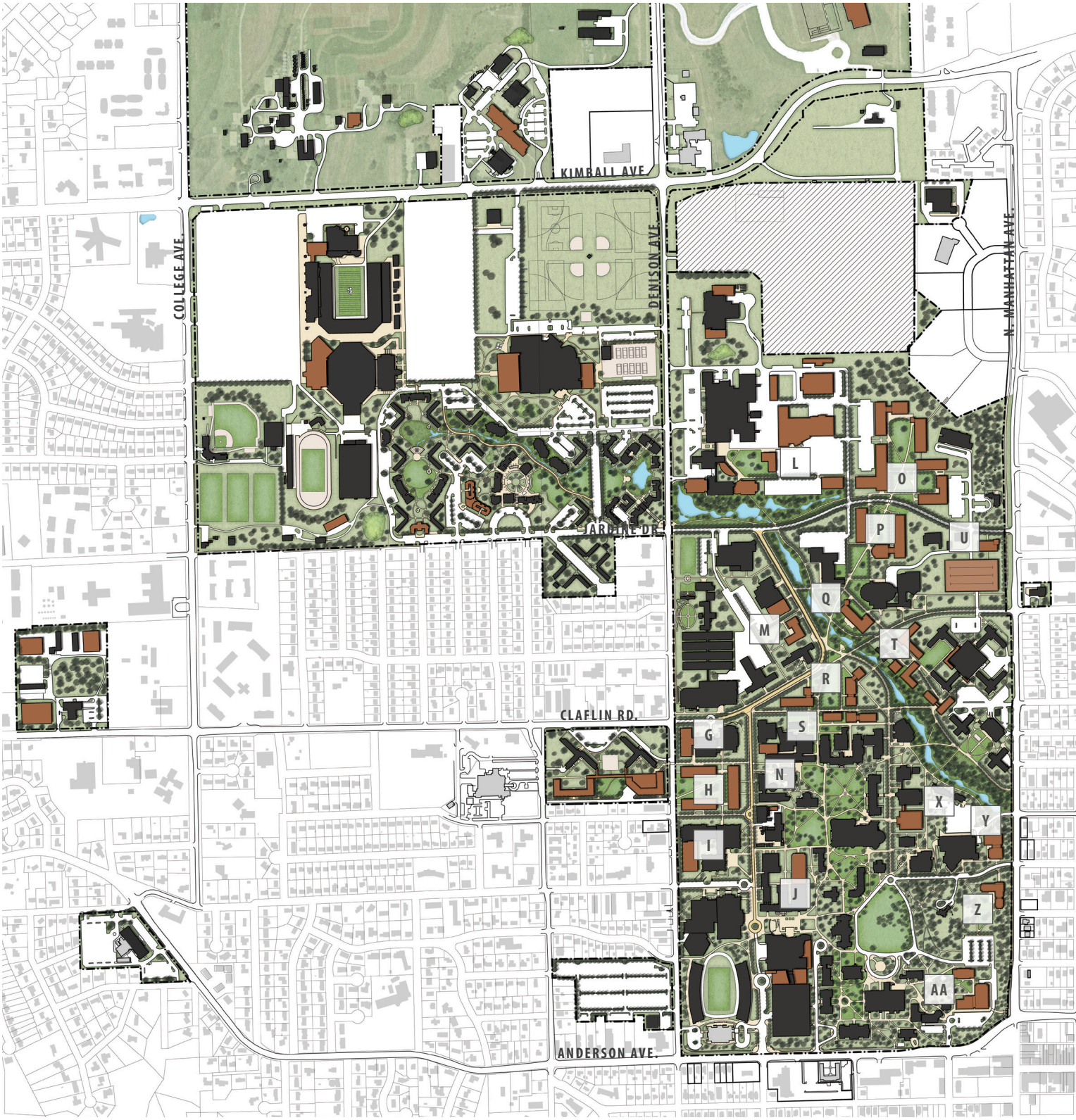
Y. New construction east of Justin Hall provides additional space for academic programs.

Z. New construction along North Manhattan Avenue provides a new home for the College of Business Administration.

AA. New construction provides additional space for performing and academic arts programs.

CAMPUS MASTER PLAN ▶

EXISTING CAMPUS BUILDING
PROPOSED CAMPUS BUILDING
NBAF
KSU CAMPUS BOUNDARY
KSU FOUNDATION PROPERTY


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
ARTHUR DR.
CLAFLIN RD.
ANDERSON AVE.
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AA

Campus Life & Support

Similarly, the Campus Master Plan proposes improvements to campus grounds and facilities to enhance and support the day-to-day experience of campus life for faculty, staff, students, and visitors. This comprehensive list includes near- and long-term projects.

NEW FACILITIES

A. A new indoor rowing facility supports Athletics programs.

B. Expansion of the Peters Recreation Complex meets student sports activities and exercise needs.

C. New residence halls provide additional on-campus housing for students; landscape and circulation improvements enhance the neighborhood feel of this part of the campus.

D. A new recreation facility with basketball, sand volleyball, and tennis supports Recreation and Athletics programs.

E. New construction provides additional space for Facilities Management programs to support new campus development.

F. Expansion and renovation of Kramer Dining Center enhances residential dining; new residence halls provide additional on-campus housing for students.

K. Expansion of the K-State Student Union creates new space for current and future needs of student programs and activities. More detailed recommendations for the renovation and expansion of the Union were developed by the K-State Student Union Study.

V. New structured parking provides as many as 1,600 additional spaces.

W. Expansion and renovation of Derby Dining Center enhances residential dining; new residence halls provide additional on-campus housing for students with views and access to a rejuvenated Campus Creek.

All other letters, see Academic and Research Facilities, page 92.

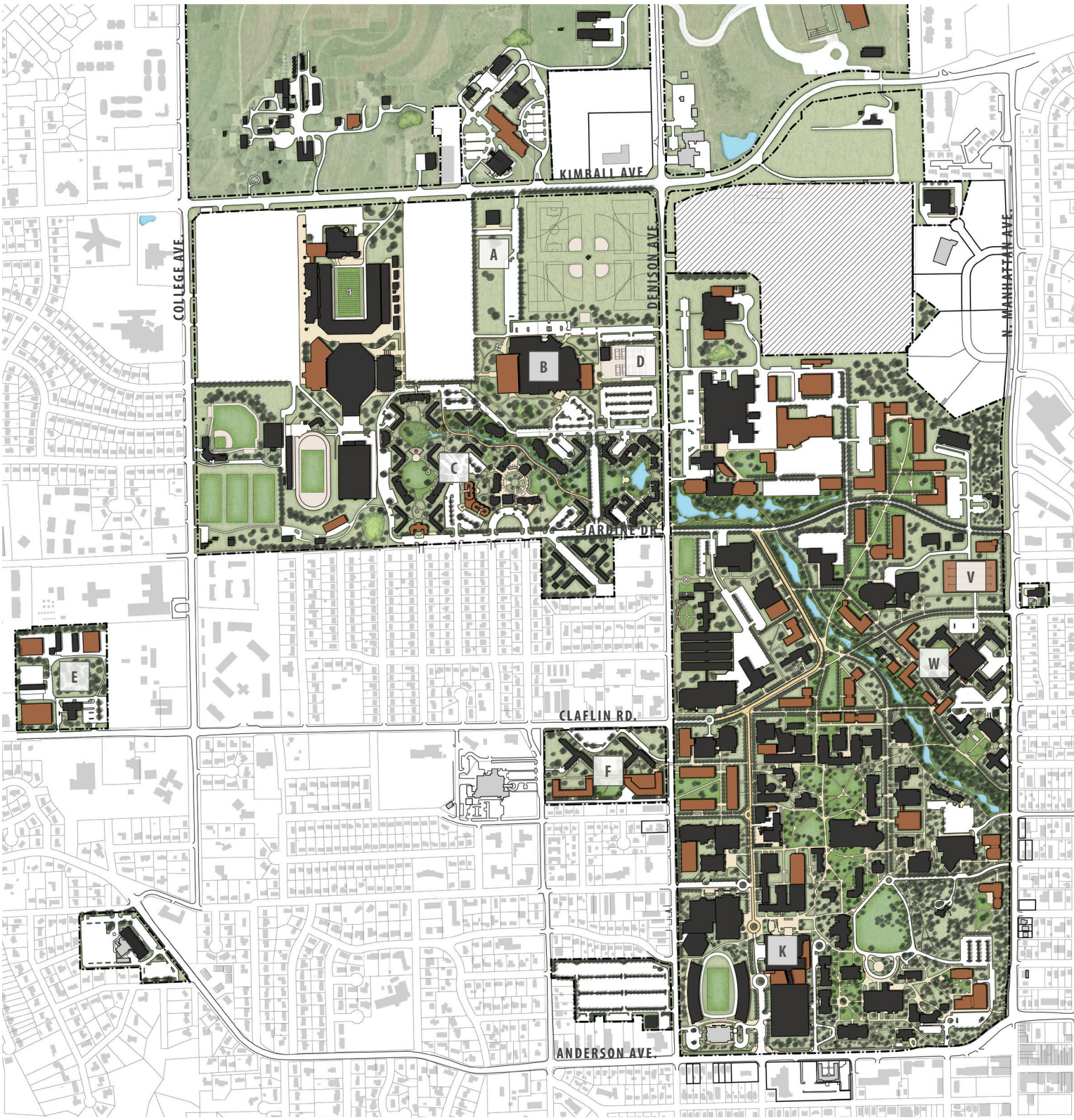
Coordination with Other Initiatives

A series of more detailed studies supported the development of the Campus Master Plan Update, including the K-State Student Union Study, the Housing and Dining Services Master Plan, the Signage and Wayfinding Master Plan, and the Veterinary Medicine Master Plan. Each of these studies documents additional findings and recommendations about the future of the physical campus that supplement the broad vision of the Campus Master Plan.

Phasing and Implementation

Implementation of the Campus Master Plan will be realized through the completion of individual projects. The exact order and disposition of design details of projects will naturally evolve as additional information about the university's needs and priorities becomes available. Implementation of the Campus Master Plan will be guided by university administration, Campus Planning and Facilities Management, and a variety of campus advisory committees, among others the Faculty Senate Committee on University Planning, the Landscape Advisory Committee, the Campus Planning and Development Advisory Committee, and the Council on Parking Operations will use these three planning tools to guide the physical development of the campus.

CAMPUS MASTER PLAN ▶


KIMBALL AVE.
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DENISON AVE.
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CLAFLIN RD.
ANDERSON AVE.

EXISTING VIEW OF CAMPUS LOOKING NORTH FROM ANDERSON AVENUE.

The Campus Master Plan identifies the potential for many new buildings on the Manhattan campus, as well as enhancements and expansion of the open space network. These “before and after” images illustrate what long-term campus development might look like compared to the existing conditions.

PROPOSED VIEW OF CAMPUS LOOKING NORTH FROM ANDERSON AVENUE.

Implementation of the Campus Master Plan Update will advance the goals of the strategic plan, and enhance the experience of students, faculty, staff, and visitors to the campus.

PLANNED PROJECTS

1. Expansion of Peters Recreation Complex
2. New and Renovated Jardine Apartments
3. Expansion of College of Veterinary Medicine
4. New Research Quadrangle
5. New Academic Building
6. New Research Quadrangle
7. New Parking Garage
8. New Academic Building
9. New Academic Building
10. Expansion of Ackert Hall
11. Expansion of Cardwell Hall
12. New Academic Quadrangle
13. Expansion of International Student Center
14. New Residence Halls and Renovated Derby Dining Center
15. New Kramer Dining Center and Residence Halls
16. New Science Quadrangle
17. College of Engineering Phase IV
18. Seaton Hall Addition for College of Architecture, Planning and Design
19. New Sciences Building
20. New College of Human Ecology Building
21. K-State Student Union Expansion
22. New College of Business Administration
23. Renovation of East Memorial Stadium for Visitor Center
24. New Performing Arts Complex

PROPOSED CAMPUS OPEN SPACE NETWORK

The quadrangles, courtyards, plazas and other green spaces that make up the open space network are some of the most picturesque and charming aspects of the campus. Moreover, the balance between open space and buildings is a defining feature of the campus character. The Campus Master Plan protects this balance with careful infill and thoughtful new development. For the most part, new buildings are sited on surface parking lots to protect the existing open space network on campus. As the Campus Master Plan is implemented the open space network will be both enhanced and expanded to improve campus connectivity, as well as provide additional opportunities for gathering, contemplation, and recreation.

EXISTING VIEW OF CAMPUS LOOKING SOUTHWEST FROM NORTH MANHATTAN AVENUE.

PROPOSED VIEW OF CAMPUS LOOKING SOUTHWEST FROM NORTH MANHATTAN AVENUE.

At left is a new facility for performing arts programs. This new space will facilitate improvements to McCain Auditorium to better support Academic Arts programs. Located between the new building east of Justin Hall and the aforementioned new performing arts facilities, is a new building for the College of Business Administration.

NEW BUILDINGS AND OPEN SPACES

1. New College of Business Administration
2. New Performing Arts Complex
3. K-State Student Union Expansion
4. Seaton Hall Addition for College of Architecture, Planning and Design
5. College of Engineering Phase IV
6. New Science Quadrangle
7. New Kramer Dining Center and Residence Halls
8. Ackert Hall Addition
9. New Sciences Building
10. New Campus Gateway
11. New College of Human Ecology Building
12. Improved Campus Creek Storm Water Management and Beautification

PLANNED RENOVATIONS

1. McCain Auditorium Renovation for Music
2. Calvin Hall Renovation
3. K-State Student Union Renovation
4. Renovation of East Memorial Stadium for Visitor Center
5. Seaton Hall Renovation for College of Architecture, Planning and Design
6. King Hall and Chemistry/Biochemistry Building Renovations
7. Bluemont Hall Renovation

EXISTING VIEW OF CAMPUS LOOKING SOUTHEAST FROM DENISON AVENUE.

PROPOSED VIEW OF CAMPUS LOOKING SOUTHEAST FROM DENISON AVENUE.

A new quadrangle between Fiedler and Ackert Halls will provide additional program space for academic and research activities.

PHASING AND IMPLEMENTATION

Coordination with Other Initiatives

A series of more detailed studies supported the development of the Campus Master Plan Update, including the K-State Student Union Study, the Housing and Dining Services Master Plan, the Signage and Wayfinding Master Plan, and the Veterinary Medicine Master Plan. Each of these studies documents additional findings and recommendations about the future of the physical campus that supplement the broad vision of the Campus Master Plan.

Implementation of the Campus Master Plan will be realized through the completion of individual projects. The exact order and disposition of design details of projects will naturally evolve as additional information about the university's needs and priorities becomes available. Implementation of the Campus Master Plan will be guided by University administration, Campus Planning and Facilities Management, and a variety of campus advisory committees, among others the Faculty Senate Committee on University Planning, the Landscape Advisory Committee, the Campus Planning and Development Advisory Committee, and the Council on Parking Operations will use these three planning tools to guide the physical development of the campus.

Working with the strategic plan, *K-State 2025*, as a guide, the University has identified approximate square footage associated with a range of institutional goals.

Under-Construction, Funded, and Planned Projects

K-State is a dynamic institution; as a result, planning, design, or construction of a number of campus improvement projects was already in progress during the master planning process. These projects all have the same goal – to address current campus needs. Altogether, 2014 Capital Improvement Plan projects represent more than 750,000 gross square feet of new or enhanced space for university activity. K-State needs these new facilities to meet current needs. Beyond the projects that are currently under-construction, funded, or planned, the university needs about 390,000 gross square feet of additional program space to meet current needs. Of the many projects represented in the Campus Master Plan Update, these projects may be included in the first phase of implementation:

- New home for College of Business Administration
- Expansion and renovation of Seaton Hall
- Expansion of the K-State Student Union

Enrollment Growth and First Phase of Research Growth

To accommodate planned enrollment growth of 12 percent by 2025, K-State will need new and enhanced facilities. At the same time, to achieve the visionary goal to be a Top 50 Public Research University by 2025, K-State will need to double the funds allotted for research. As much as 750,000 gross square feet of new space might be needed to support a first phase enrollment and research growth.

CURRENT CAPITAL PLAN PROJECTS ▶

EXISTING BUILDINGS
CURRENT CAPITAL PLAN PROJECTS


KIMBALL AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
JARDINE DR.
CLAFLIN RD.
ANDERSON AVE.

Top 50 Public Research University Needs

An additional 175,000 gross square feet has been identified to support research growth that will propel K-State to be a Top 50 Public Research University by 2025.

Site Development Capacity

Above and beyond the square footage that will likely be necessary for K-State to achieve the visionary goal to be a Top 50 Public Research University, the Campus Master Plan Update identifies additional development potential to support future and as-yet unidentified needs of the university.

The areas cited in this chart are calculated in gross square feet (GSF) and are recommended based upon appropriate massing established by the Campus Master Plan. They document the general intent of the master plan and provide a point of reference in planning for future development of individual building sites. In addition to site capacity and design considerations, development decisions will also be guided by program needs and financial considerations.

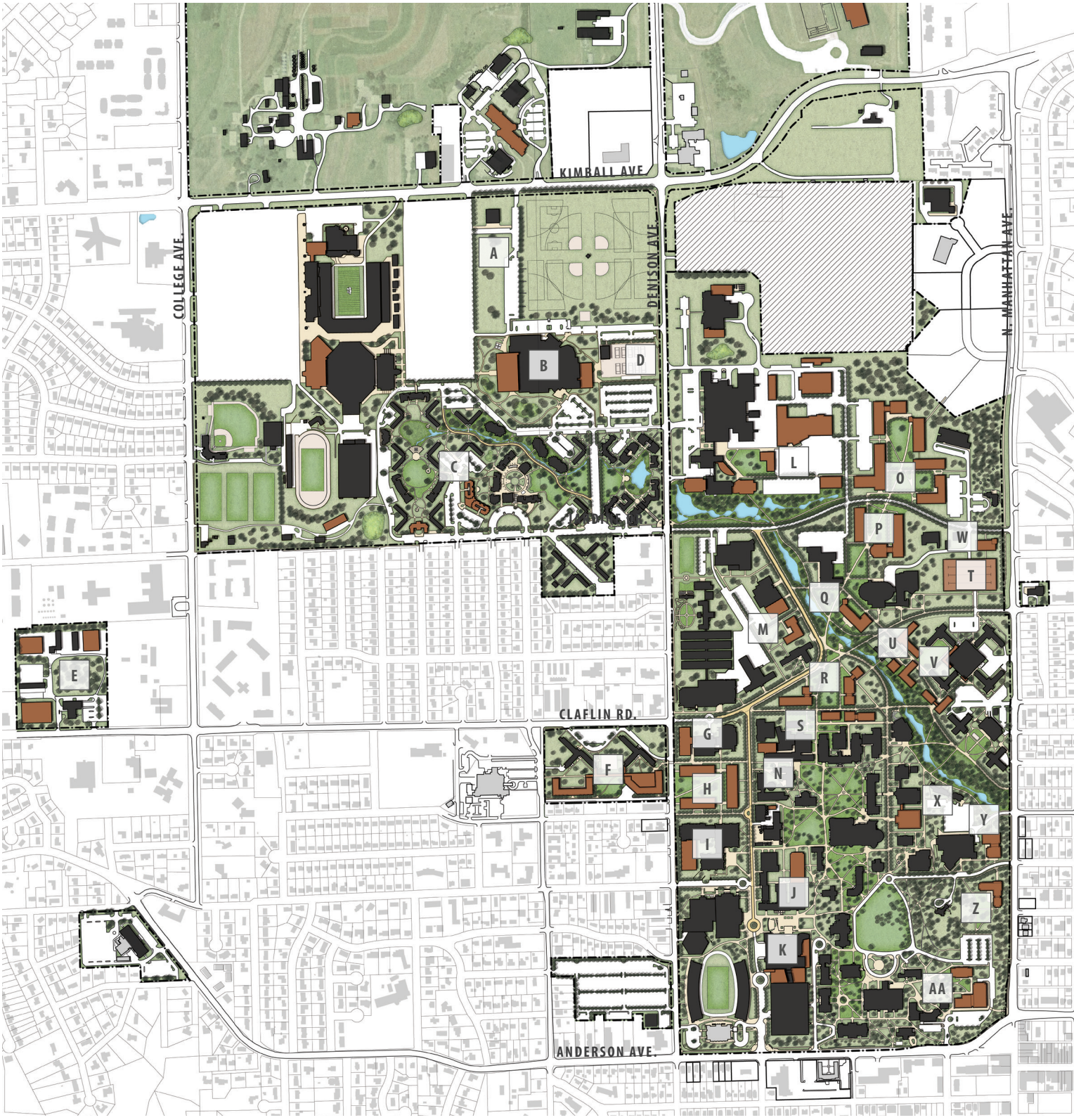
PROJECT NAME	USE / TYPE	APPROX. FOOTPRINT GSF	NUMBER OF FLOORS	APPROX. TOTAL GSF	MAP REFERENCE
PLANNED PROJECTS					
COLLEGE OF BUSINESS ADMINISTRATION - NEW BUILDING	ACADEMIC			**120,000**	Z
GENERAL CLASSROOM BUILDING (NORTH OF WATERS HALL)	ACADEMIC			**66,000**	S
COLLEGE OF VETERINARY MEDICINE MASTER PLAN	ACADEMIC/RESEARCH				
COLES 1				58,500	L
TEACHING & STUDENT CENTER				18,500	
COLES 2				69,500	
KS VDL				78,000	
COLLABORATIVE LAB				27,000	
EQUINE CENTER				17,000	
CLINIC				12,500	
LARC ADDITION				15,500	
				296,500	
CARDWELL HALL EXPANSION	ACADEMIC	5,400	3	**16,200**	N
INTERNATIONAL STUDENT CENTER EXPANSION	STUDENT LIFE	6,500	2	**13,000**	U
KRAMER COMPLEX	STUDENT LIFE				F
DINING CENTER REPLACEMENT				44,200	
NEW RESIDENCE HALL WEST		21,500	6	129,000	
NEW RESIDENCE HALL EAST		21,500	6	129,000	
				302,200	
COLLEGE OF ENGINEERING COMPLEX - PHASE IV	ACADEMIC	20,000	4	**80,000**	I
INDOOR ROWING FACILITY	ATHLETICS			**10,000**	A
TOTAL GSF - PLANNED NEW CONSTRUCTION				**903,900**	

PROJECT NAME	USE / TYPE	APPROX. FOOTPRINT GSF	NUMBER OF FLOORS	APPROX. TOTAL GSF	MAP REFERENCE
PROPOSED PROJECTS					
K-STATE UNION ADDITIONS	STUDENT LIFE				K
EAST		10,000	2	20,000	
SOUTHWEST		12,000	3	36,000	
SOUTHEAST		11,000	3	33,000	
				89,000	
SEATON HALL ADDITION	ACADEMIC				J
EAST WING		25,000	3	75,000	
				75,000	
NORTH OF COLLEGE OF ENGINEERING COMPLEX (LOT A-28)	ACADEMIC/RESEARCH				H
SOUTH		22,000	4	88,000	
EAST		28,000	4	112,000	
NORTH		22,000	4	88,000	
				288,000	
ACKERT HALL ADDITION	ACADEMIC	19,000	4	**76,000**	G
NORTH OF DICKENS HALL	ACADEMIC	25,000	4	**100,000**	X
EAST OF JUSTIN HALL	ACADEMIC	22,000	3	**66,000**	Y
PERFORMING ARTS - NEW BUILDING (LOT A-2)	PERFORMING ARTS	32,200	2	**64,400**	AA
NORTH OF PERFORMING ARTS - NEW BLDG (LOT A-2)	ACADEMIC	12,500	3	**37,500**	
NORTH OF WATERS HALL (LOT A-17)	ACADEMIC/RESEARCH				R
BLDG 1		15,000	4	60,000	
BLDG 2		9,500	4	38,000	
BLDG 3		22,000	4	88,000	
				186,000	
NORTHWEST OF WATERS HALL (LOT A-18)	ACADEMIC/RESEARCH	22,000	4	**88,000**	R
MID-CAMPUS DRIVE INFILL	ACADEMIC/RESEARCH				M
DOLE HALL ADDITION		15,000	4	60,000	
NORTH OF UMBURGER HALL - NEW BLDG		17,000	4	68,000	
				128,000	
SW OF WEBER HALL SITE INFILL	ACADEMIC/RESEARCH	24,000	4	**96,000**	Q
PARKING GARAGE (EAST OF WEBER HALL)	STRUCTURED PARKING	96,000	4	**384,000**	T
1,200 CARS AT 320 GSF/SPACE					
NORTH OF PROPOSED PARKING GARAGE	ACADEMIC/RESEARCH	12,500	4	**50,000**	W
NORTH OF WEBER HALL (LOT B-16/17)	COLLABORATIVE RESEARCH				P
BLDG 1		41,000	4	164,000	
BLDG 2		22,000	4	88,000	
				252,000	

PROJECT NAME	USE / TYPE	APPROX. FOOTPRINT GSF	NUMBER OF FLOORS	APPROX. TOTAL GSF	MAP REFERENCE
NORTH OF REALIGNED JARDINE DRIVE (LOT B-18)	COLLABORATIVE RESEARCH				C
BLDG 1		43,000	4	172,000	
BLDG 2		35,000	4	140,000	
BLDG 3		24,000	4	96,000	
BLDG 4		19,000	4	76,000	
BLDG 5		27,000	4	108,000	
				592,000	
PETERS ATHLETIC CENTER ADDITIONS	ATHLETICS/REC				B
NATATORIUM (WEST)		45,000	1	45,000	
EAST		18,000	1	18,000	
				63,000	
NEW TENNIS CENTER	ATHLETICS/REC	7,000	1	**7,000**	D
DERBY COMPLEX	STUDENT LIFE				V
DINING RENOVATION AND EXPANSION		5,000	1	5,000	
NEW RESIDENCE HALL NORTH		17,000	6	102,000	
NEW RESIDENCE HALL MIDDLE		17,000	6	102,000	
NEW RESIDENCE HALL SOUTH		17,000	6	102,000	
				311,000	
FACILITIES EXPANSION ON CLAFLIN ROAD (WEST OF COLLEGE AVE)	SUPPORT				E
NORTHWEST		21,800	1	21,800	
NORTHEAST		19,000	1	19,000	
SOUTH		34,800	1	34,800	
				75,600	
TOTAL GSF - PROPOSED MASTER PLAN FOOTPRINTS				**2,934,000**	
W/ PARKING GARAGE				**3,318,000**	

PROPOSED DEMOLITION					
EDWARDS HALL				**54,758**	
BUSHNELL ANNEX				**2,328**	
DAVENPORT HALL				**13,497**	
ENGLISH/COUNSELING SERVICES BUILDING				**33,666**	
TOTAL GSF - DEMOLITION				**104,249**	

NET NEW GSF	**2,829,751**



CAMPUS MASTER PLAN ▲ EXISTING CAMPUS BUILDING PROPOSED CAMPUS BUILDING

CAMPUS-WIDE IMPACT

The Campus Master Plan establishes a broad vision for the future of the physical campus. As such, the exact details of implementation remain to be determined. The in-depth studies that supported the development of the Campus Master Plan Update, including the K-State Student Union Study, the Housing and Dining Services Master Plan, the Signage and Wayfinding Master Plan, and the Veterinary Medicine Master Plan provide supplemental detail about some select aspects of the physical campus in the future. Specifics about other facets of campus life have yet to be determined, but the implementation of the Campus Master Plan is expected to have a transformative, campus-wide impact on circulation, parking and transit, and open space.

Circulation

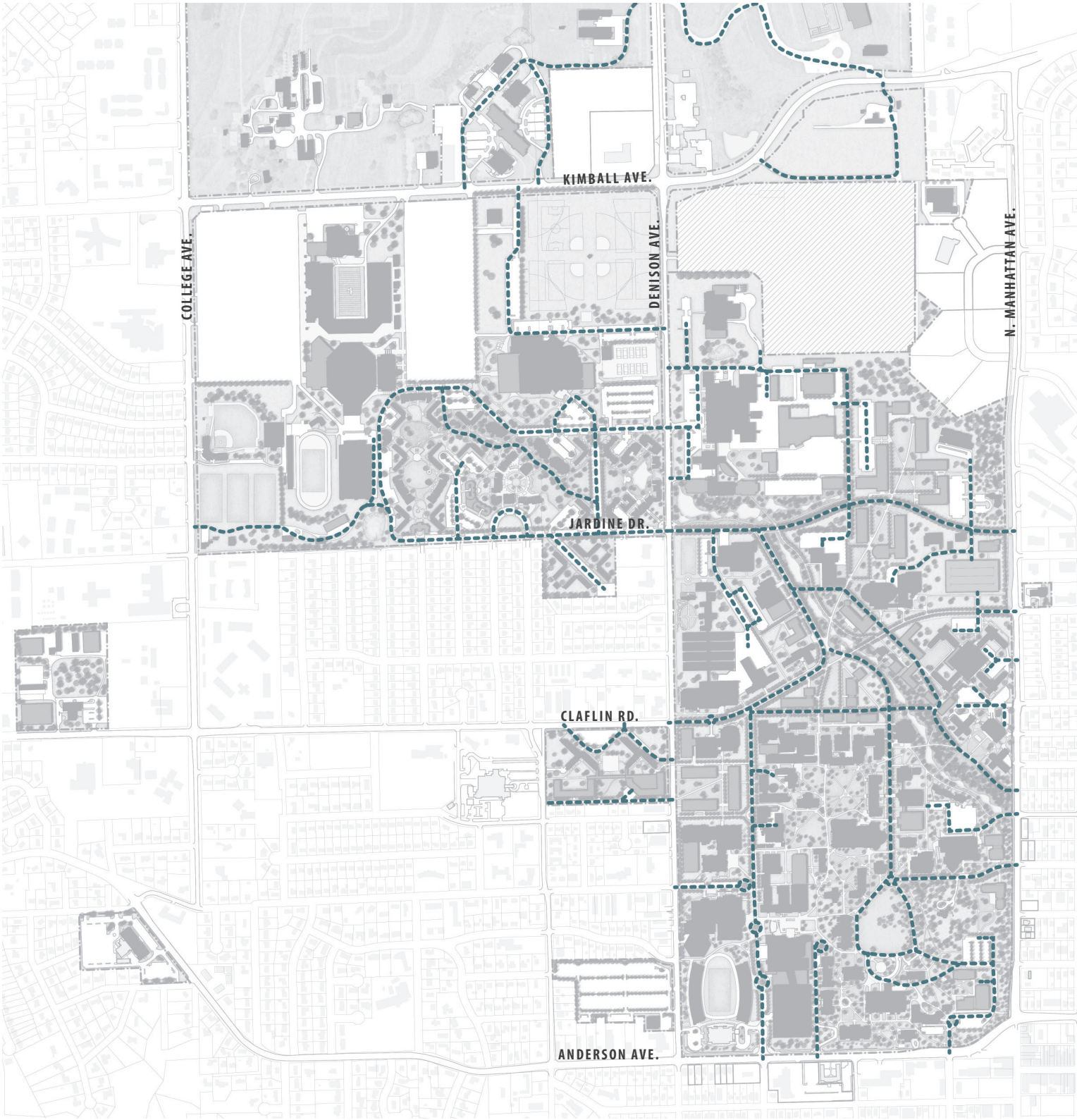
Modifications to circulation keep automobiles at the campus perimeter to expand the pedestrian zone of campus. This expansion enhances pedestrian safety on campus and improves the continuity of the campus from Anderson Avenue all the way north to a re-aligned Jardine Drive.

Service & Emergency Access

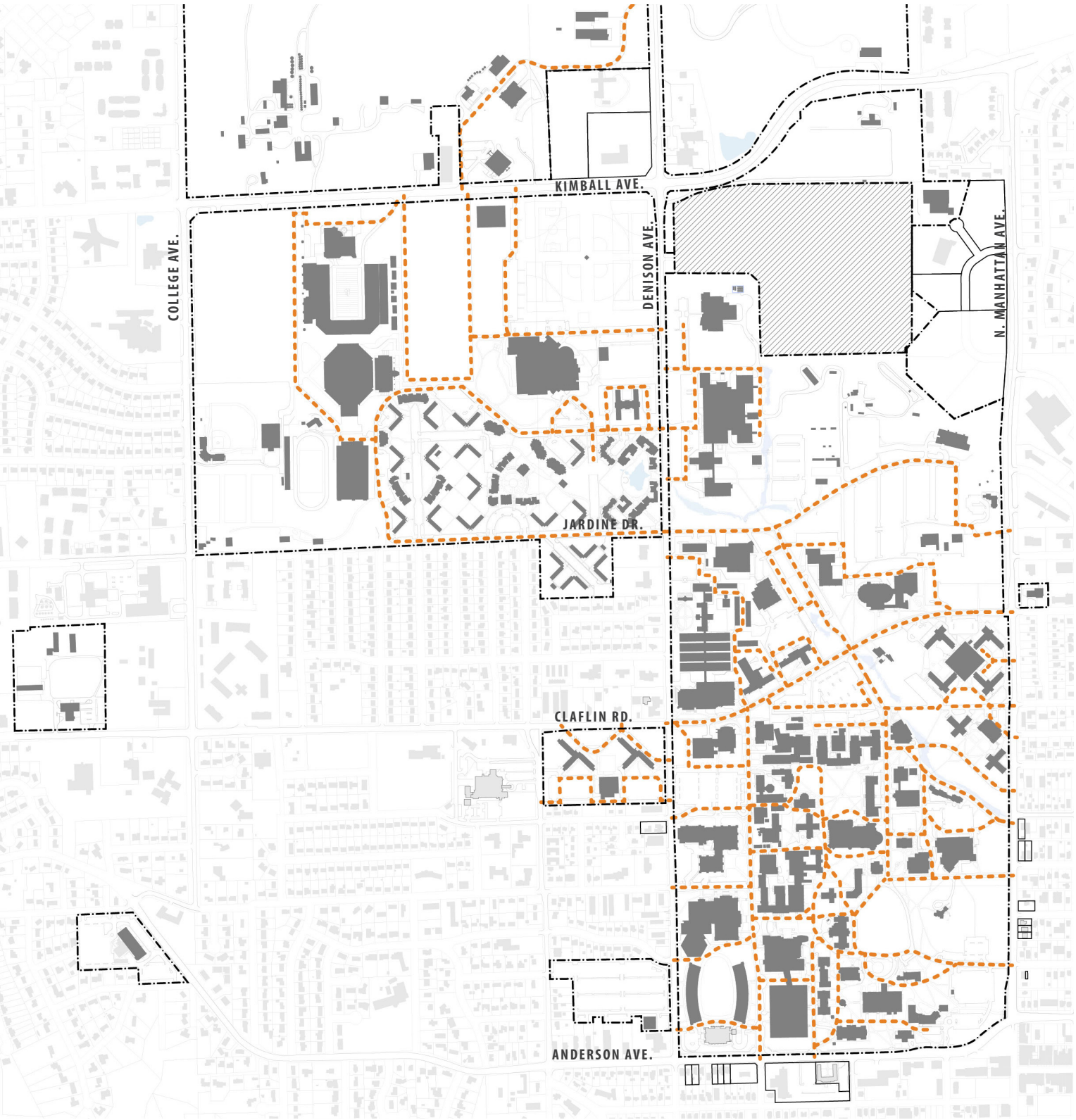
Service, handicapped, and emergency access support the day-to-day activities of faculty, staff, students, and visitors on campus. These functions can be provided in a way that facilitates regular and convenient access and enhances the character of the campus. Maintaining the utility of service, handicapped, and emergency access is achieved through as-needed, controlled access of North 17th Street between the K-State Student Union and Claflin Road, as well as Mid-Campus Drive between Lovers Lane and Old Claflin Road. University operations and policy, coordinated with proposed changes to physical infrastructure could greatly reduce the negative impacts of large trucks associated with service and deliveries.

▲ **EXISTING & PROPOSED VEHICULAR CIRCULATION**

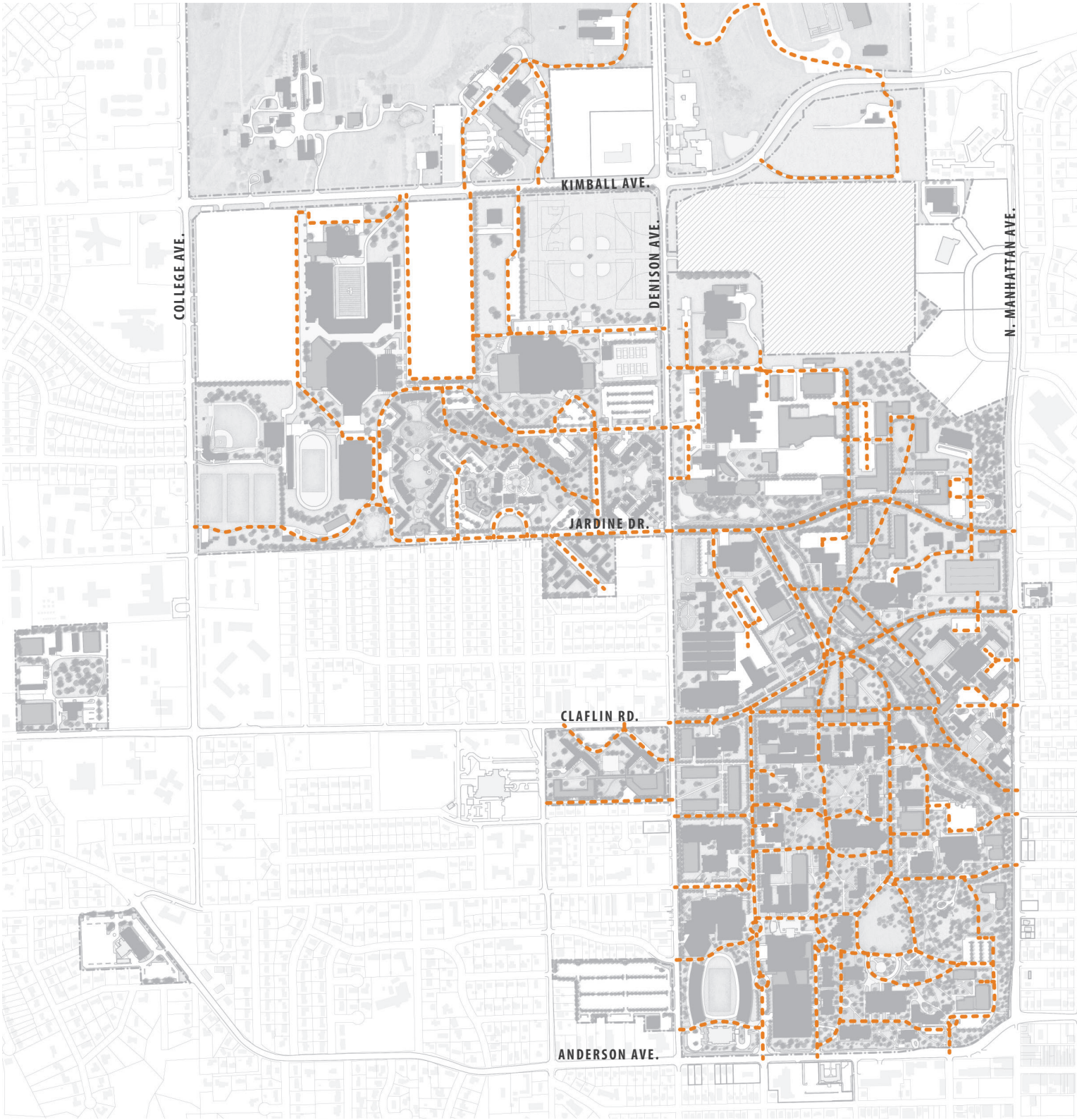
*SEE PAGES 76 - 77 FOR FULL-SIZE IMAGES.



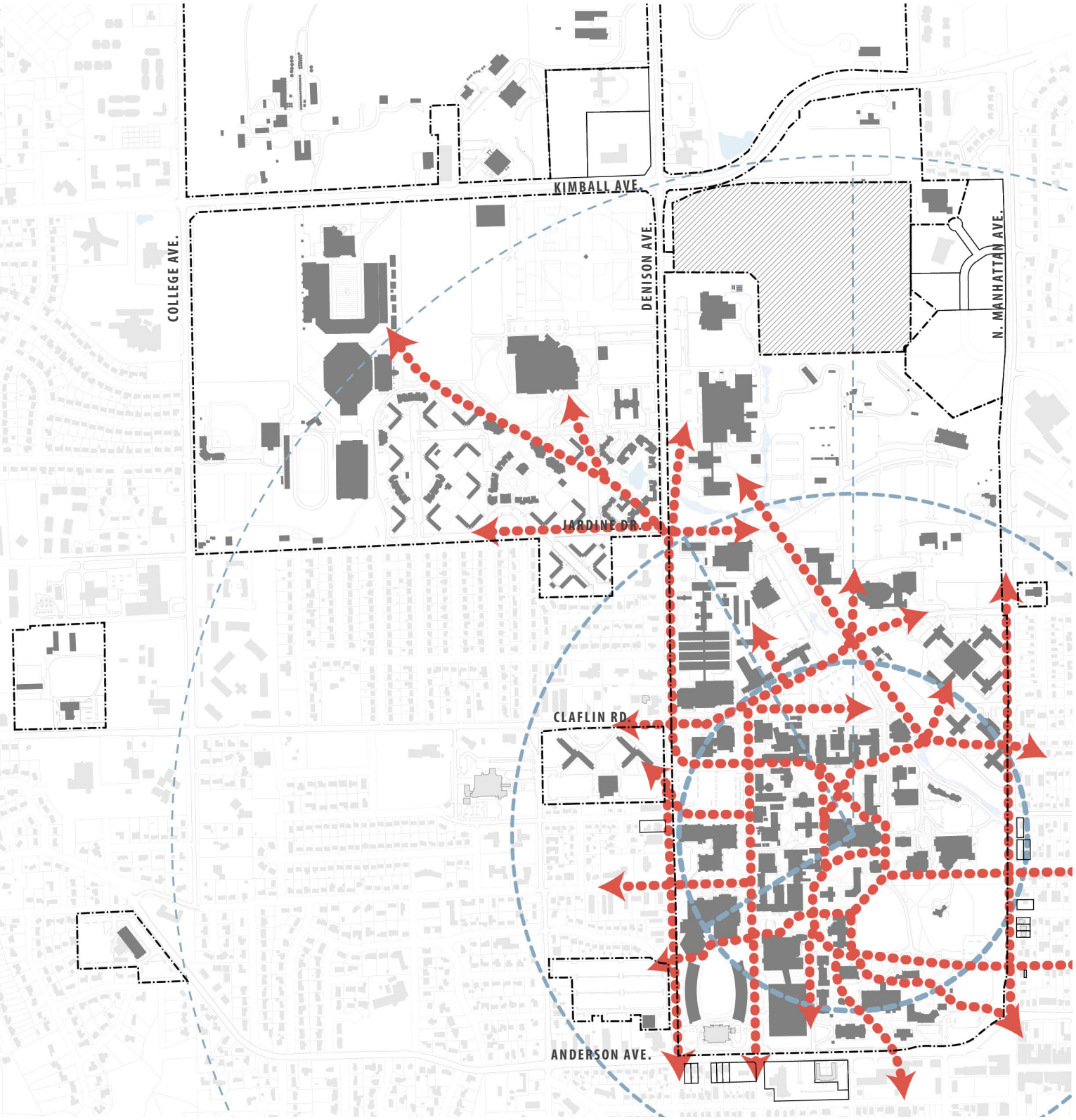
PROPOSED SERVICE ACCESS ▲ SERVICE ACCESS



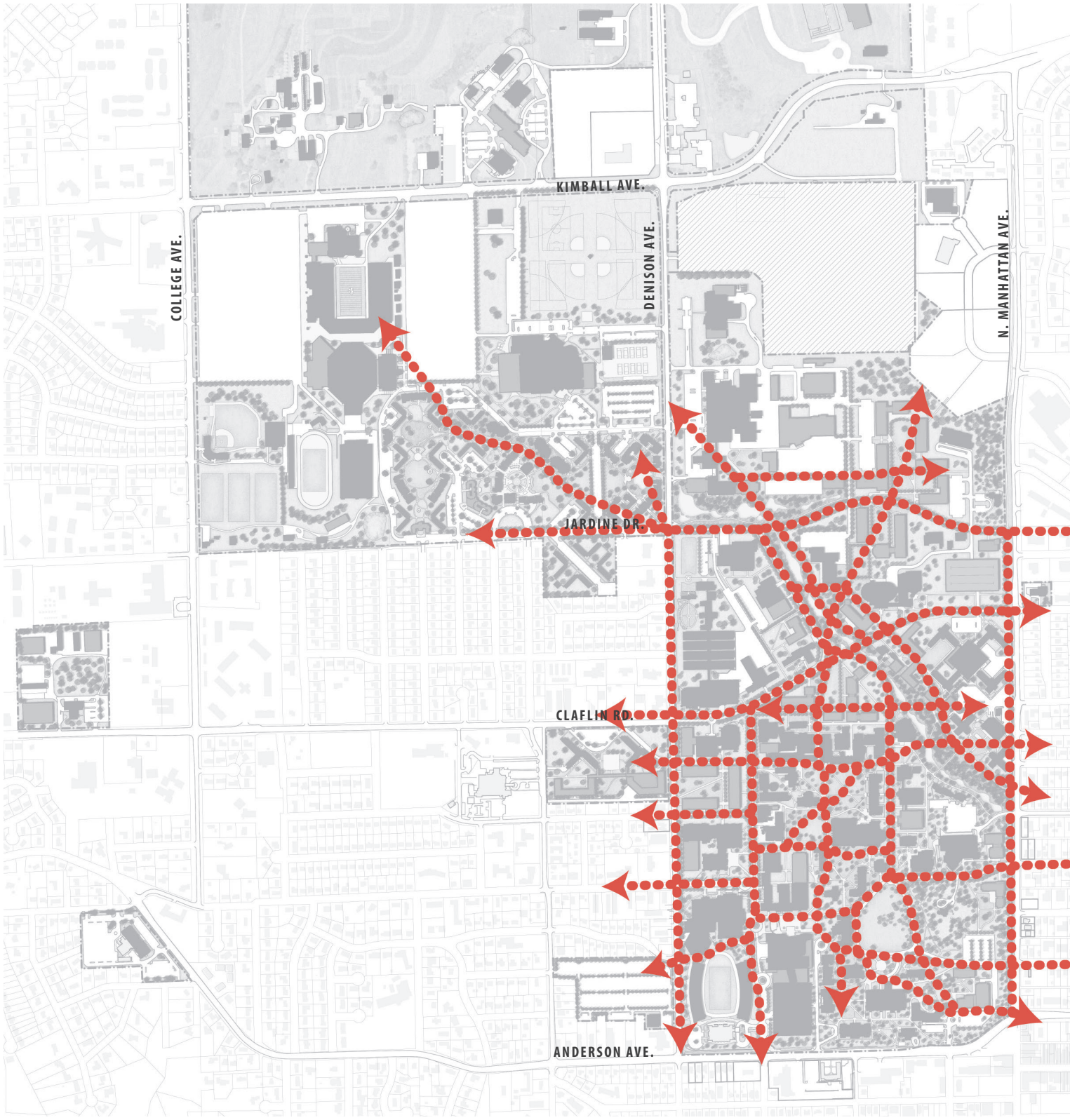
EXISTING EMERGENCY ACCESS ▲ EMERGENCY ACCESS EXISTING CAMPUS BUILDING



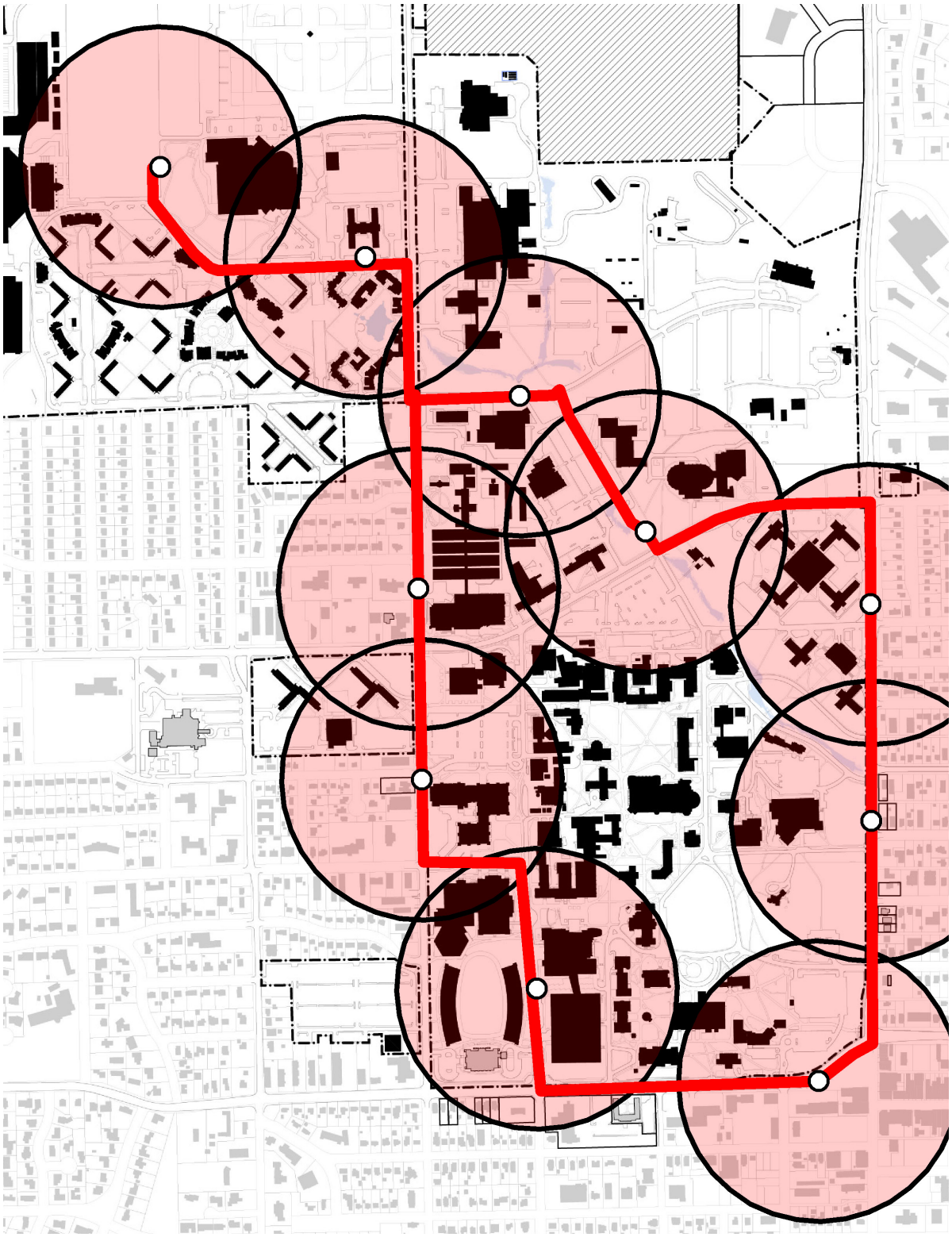
PROPOSED EMERGENCY ACCESS ▲ EMERGENCY ACCESS



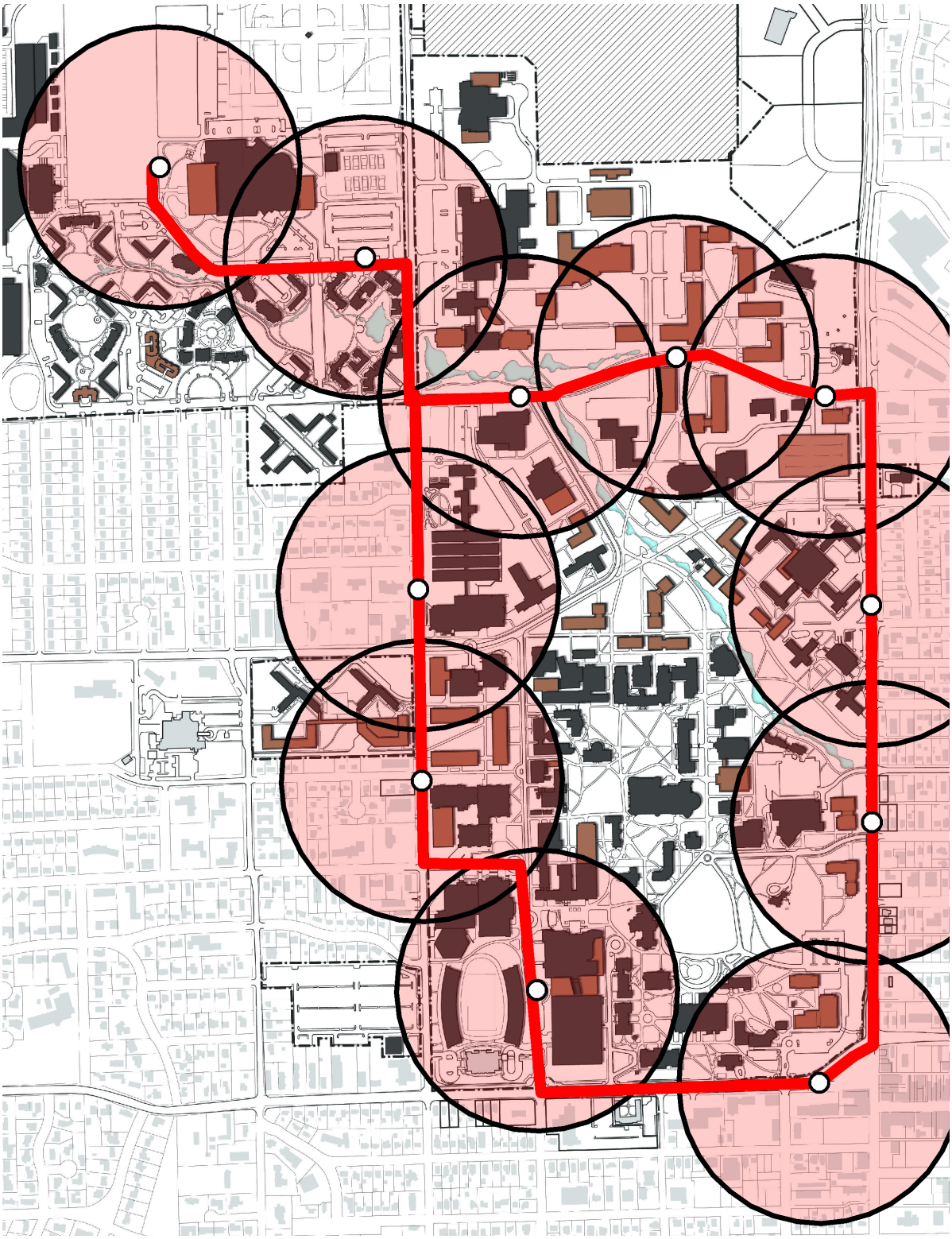
EXISTING PEDESTRIAN PATTERNS ▲ PRIMARY PEDESTRIAN MOVEMENT



PROPOSED PEDESTRIAN PATTERNS ▲ PRIMARY PEDESTRIAN MOVEMENT



SHORT-TERM PROPOSED TRANSIT ▲ THREE MINUTE WALK RADIUS POTENTIAL TRANSIT STOP



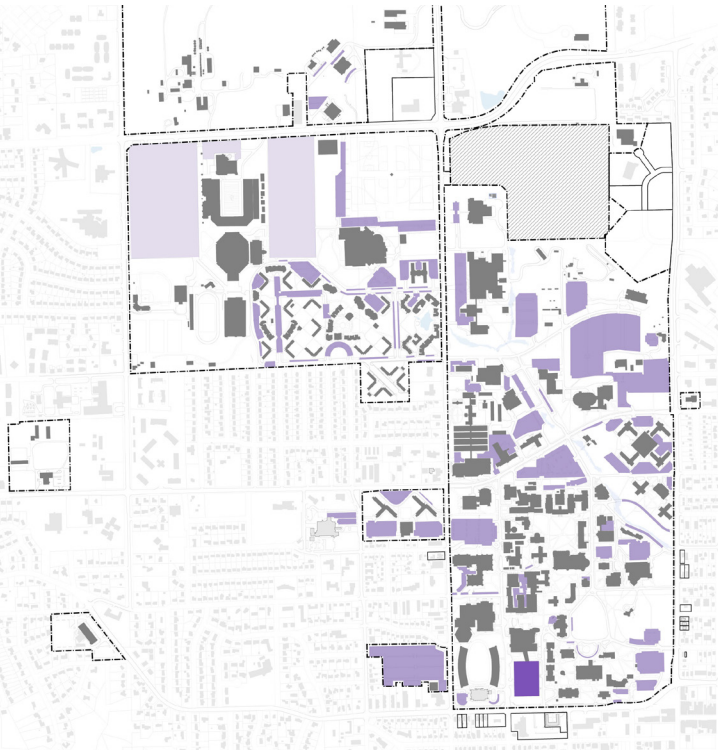
LONG-TERM PROPOSED TRANSIT ▲ THREE MINUTE WALK RADIUS POTENTIAL TRANSIT STOP

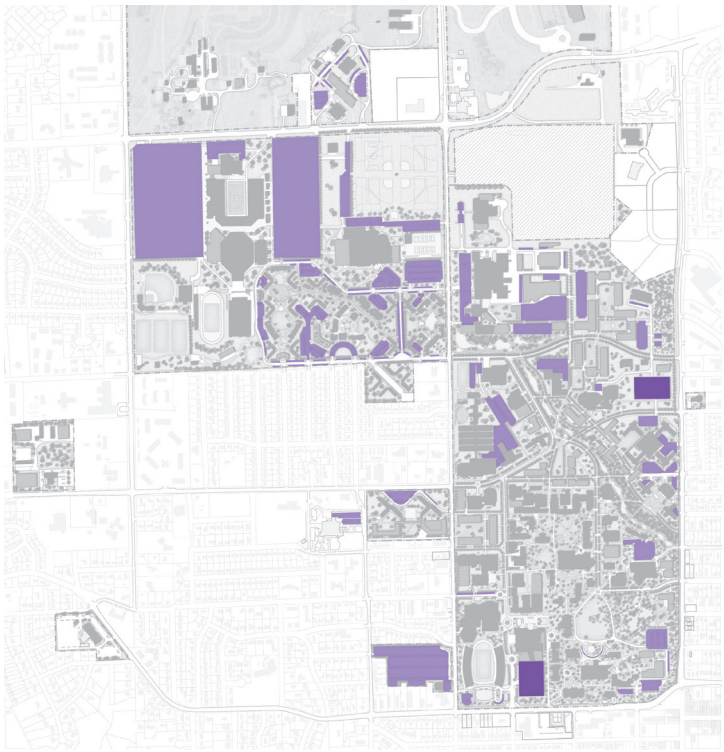
Transit

Improved transit can serve both internal campus movement as well as provide an alternative to driving to work or class for commuters. Promoting and utilizing the newly instituted ATA fixed routes will be an important component of reducing demand on an increasingly strained parking system as the university grows. Convenient and frequent shuttle service on campus would improve campus circulation as the campus grows in population and the core of campus grows geographically. As the City of Manhattan and Kansas State University grow, coordination of transit planning and funding will be vital. Coordinating planning, funding, and operations would avoid route duplication, improve service frequency and coverage, and simplify route confusion, thereby improving service convenience and increasing ridership.

Parking

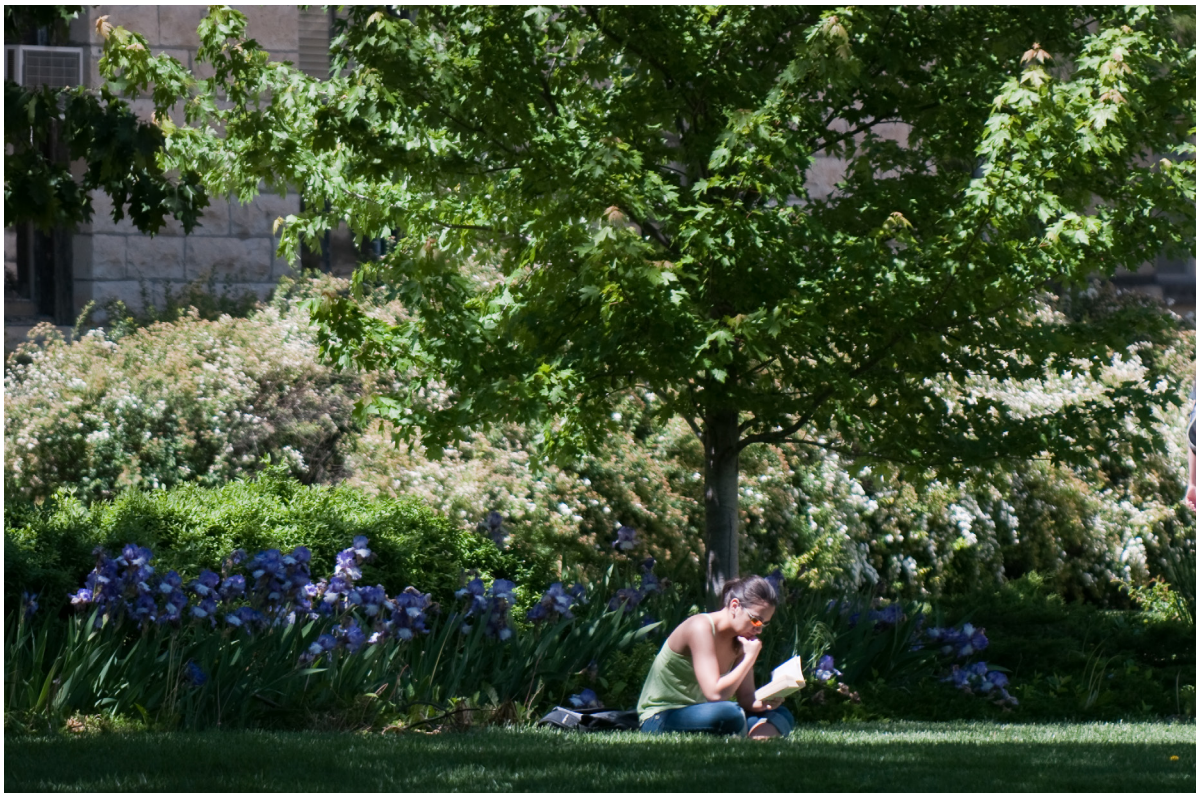
The university will manage future increased demand for parking with a Travel Demand Management program and other policy measures, but additional parking spaces will also be needed. The Campus Master Plan organizes the large majority of surface parking around the periphery of campus and calls for on-going collaboration with local ATA service to expand transit routes and make this mode of travel more reliable.





▲ **EXISTING & PROPOSED PARKING** STRUCTURED PARKING SURFACE PARKING ATHLETICS SURFACE PARKING

*SEE PAGES 78 - 79 FOR FULL-SIZE IMAGES.



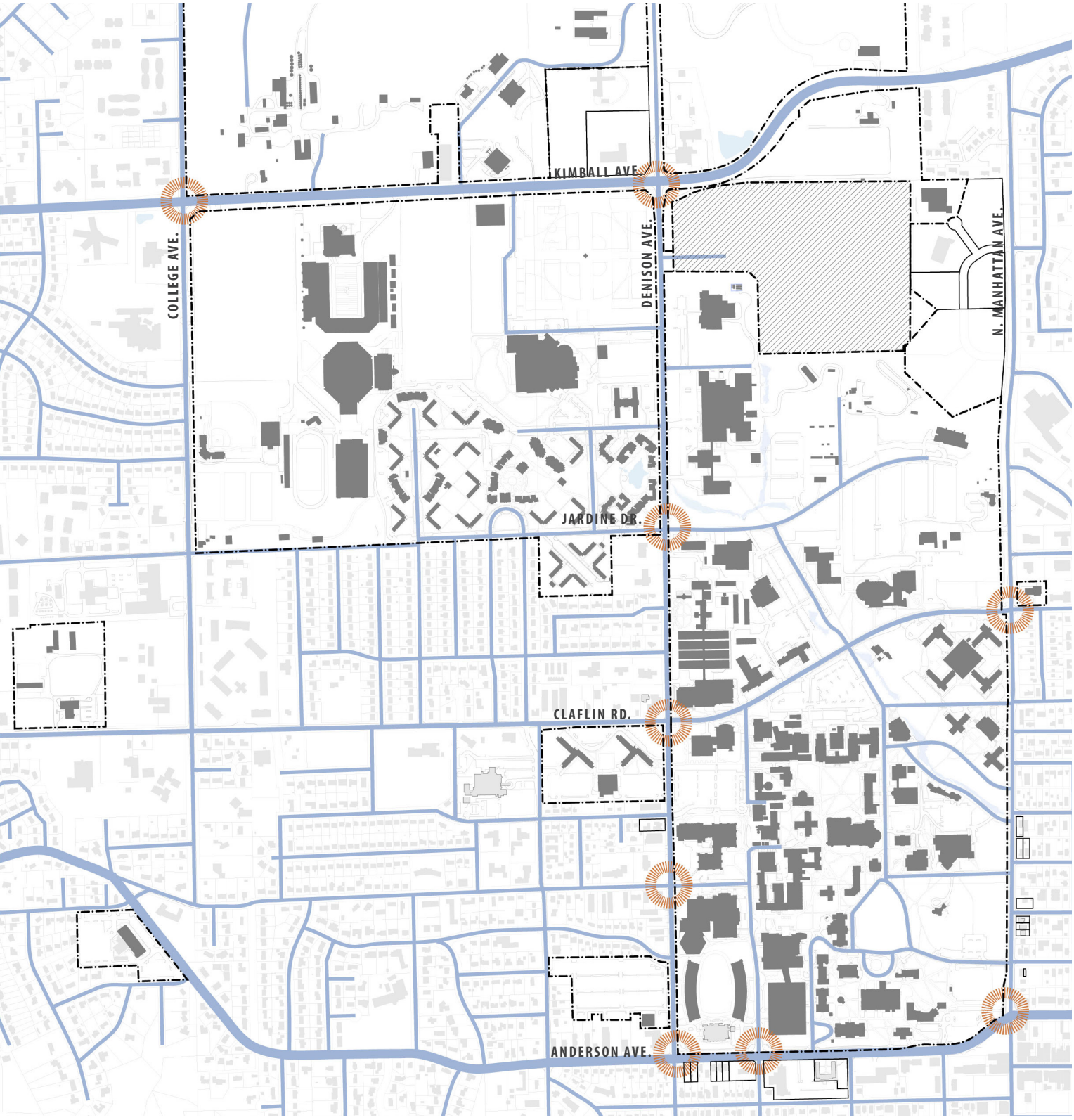
THE GREEN SPACES THAT MAKE UP THE OPEN SPACE NETWORK ARE SOME OF THE MOST PICTURESQUE AND CHARMING ASPECTS OF THE CAMPUS.

Gateways

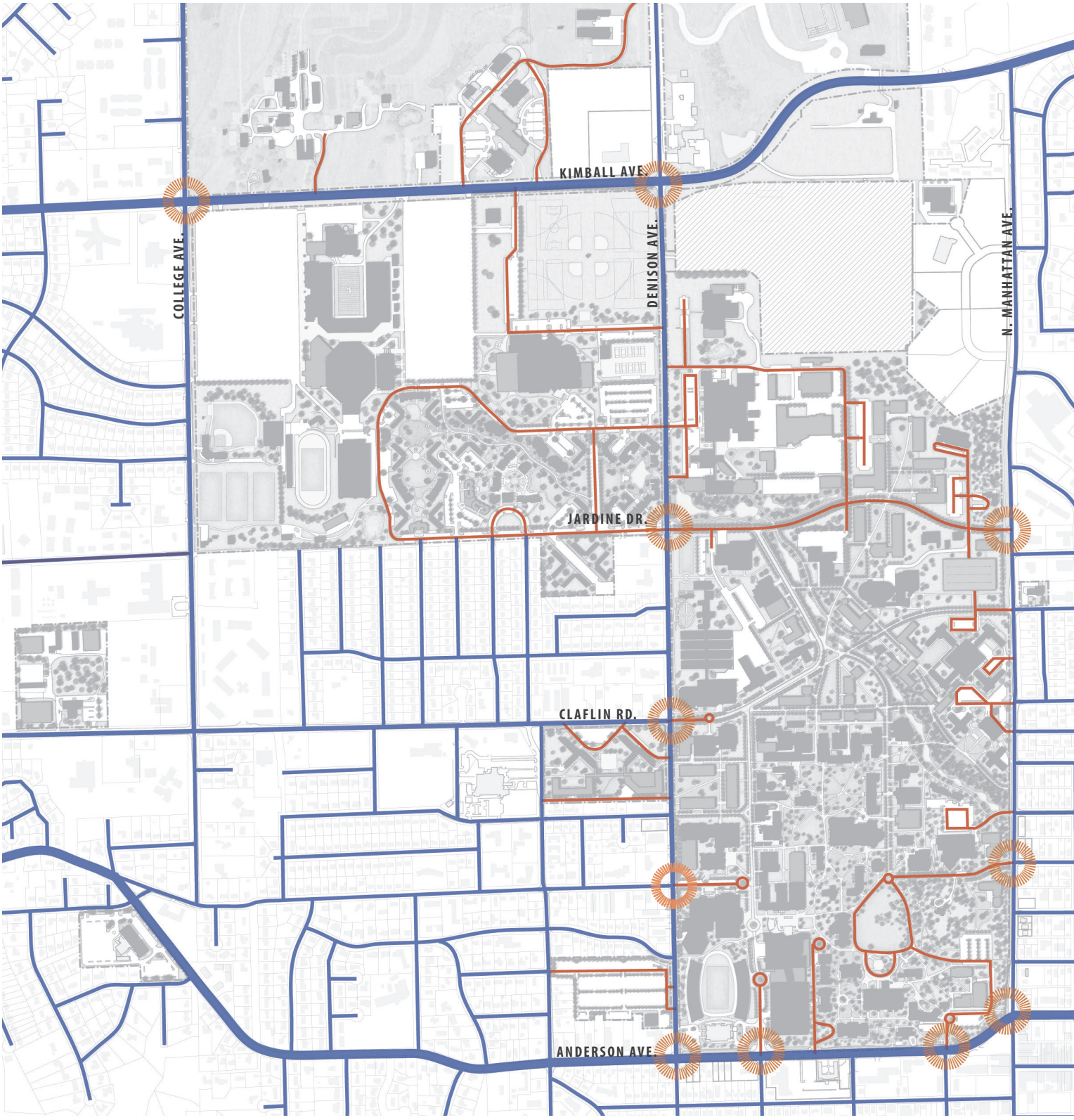
There are a number of gateways on the perimeter of campus that signal arrival to a university visitor who is walking to campus or approaching in a vehicle. Proposed modifications to campus circulation suggest that the Higganbotham and Peine Gates will remain important points of arrival, while the gateways on Claflin Road at Denison Avenue, along with the minor gateway at College Heights Road, will become less significant points of arrival to the campus. The new alignment of Jardine Drive, between North Manhattan and Denison Avenues will create a prominent new gateway on the east side of campus at the intersection of Jardine Drive and North Manhattan Avenue. A second new gateway will be at the realigned intersection of Lovers Lane and North Manhattan Avenue.

Open Space

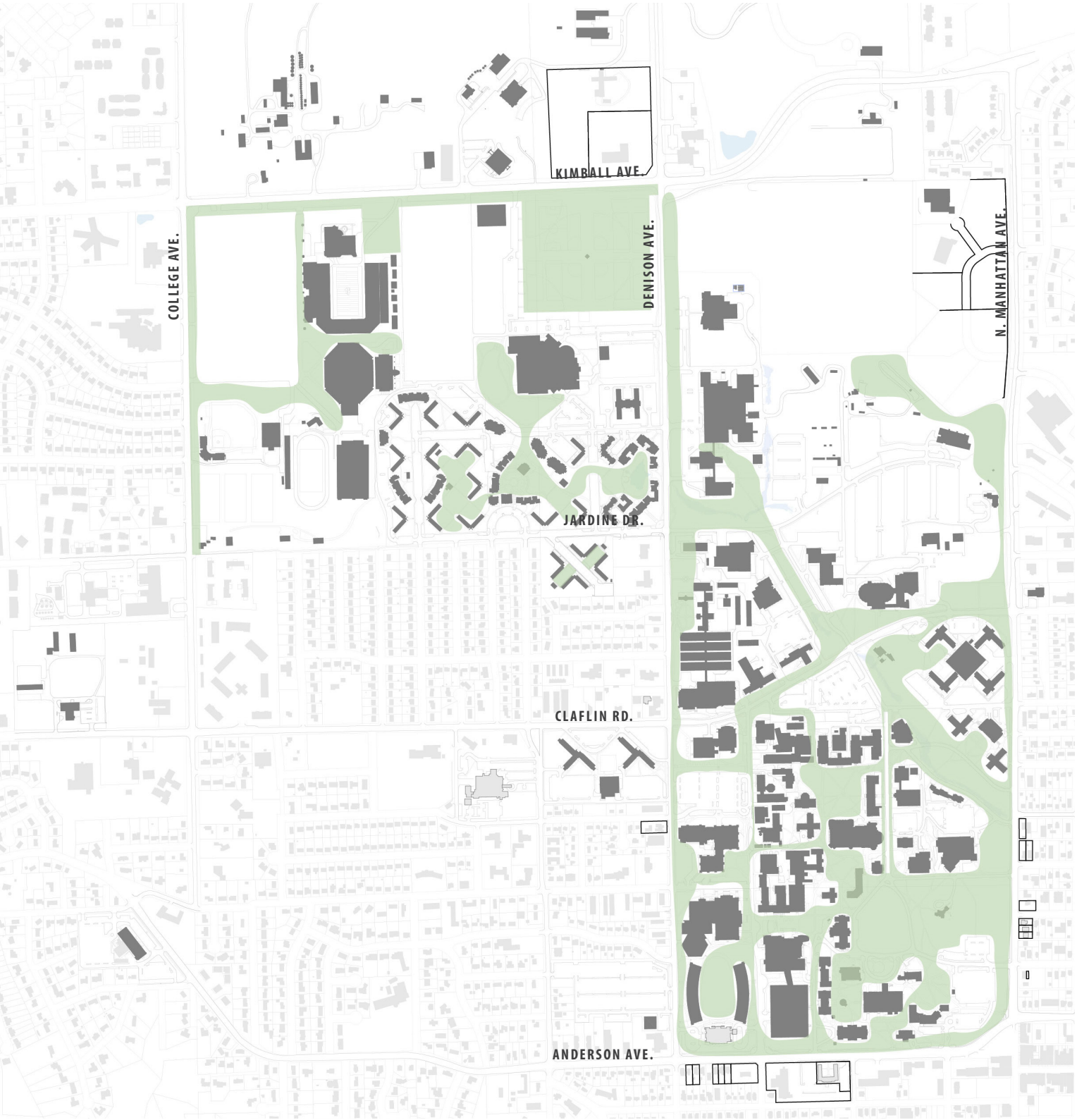
The quadrangles, courtyards, plazas and other green spaces that make up the open space network are some of the most picturesque and charming aspects of the campus. Moreover, the balance between open space and buildings is a defining feature of the campus character. The Campus Master Plan protects this balance with careful infill and thoughtful new development. For the most part, new buildings are sited on surface parking lots to protect the existing open space network on campus. As the Campus Master Plan is implemented the open space network will be both enhanced and expanded to improve campus connectivity, as well as provide additional opportunities for gathering, contemplation, and recreation.



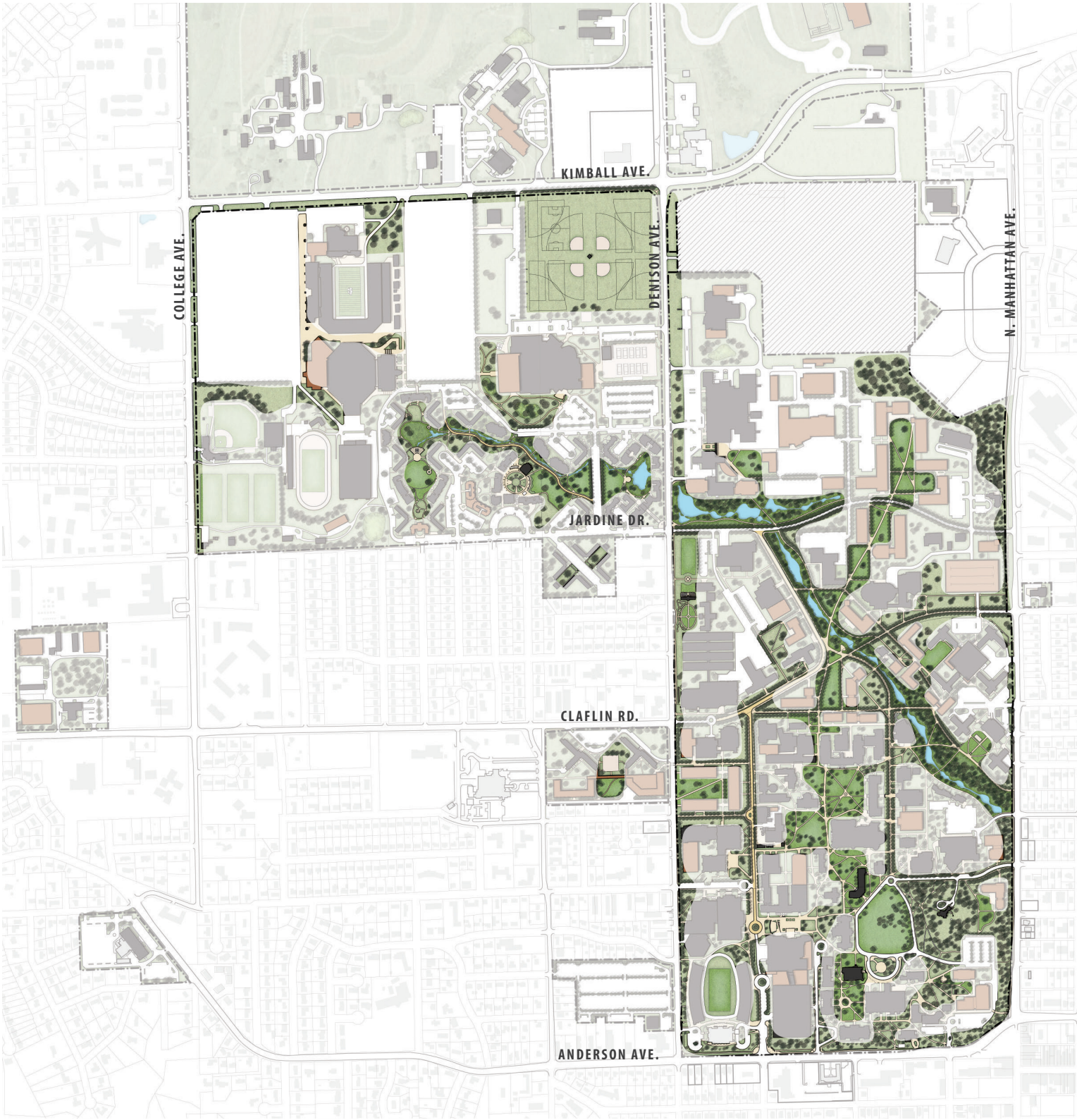
EXISTING CAMPUS GATEWAYS ▲ CAMPUS GATEWAY ROAD NETWORK EXISTING CAMPUS BUILDING



PROPOSED CAMPUS GATEWAYS ▲ CAMPUS GATEWAY PUBLIC STREET CAMPUS STREET



EXISTING OPEN SPACE NETWORK ▲ EXISTING OPEN SPACE EXISTING CAMPUS BUILDING



PROPOSED OPEN SPACE NETWORK ▲ PROPOSED OPEN SPACE

THESE HIGH LEVEL DESIGN CONSIDERATIONS ARE INTENDED TO PRESERVE AND ENHANCE THE UNIQUE AND COHESIVE AESTHETIC CHARACTER OF THE UNIVERSITY. MORE DETAILED TECHNICAL SPECIFICATIONS ARE FOUND ON THE K-STATE CAMPUS PLANNING AND FACILITIES MANAGEMENT WEBSITE. CAMPUS PLANNING AND FACILITIES MANAGEMENT WILL DIRECT FUTURE CAMPUS DEVELOPMENT IN ACCORDANCE WITH THESE CONSIDERATIONS AND STATE STATUTES. THE CAMPUS PLANNING AND DEVELOPMENT ADVISORY COMMITTEE SHALL USE THESE CONSIDERATIONS IN THEIR REVIEW OF PROPOSED CAMPUS DEVELOPMENTS.

INTRODUCTION

The K-State buildings in the historic core reflect a collegiate campus setting with a limited palette of building materials, which are primarily of limestone. Many of these buildings are facing quadrangles, forming a series of interconnected informal open lawns with shade trees that define the campus. Historic Anderson Hall facing the "Oval" establishes a protected lawn and our campus image, and thus the height of other buildings within the academic core should be no taller than Anderson Hall's primary roof line. The K-State campus is architecturally eclectic but unified through materials, scale, and open space.

DESIGN GUIDELINES SERVE TO MAINTAIN AND ENHANCE CAMPUS CHARACTER.

GUIDING PRINCIPLES

Environmental Stewardship

The University's goal is to be energy efficient and environmentally responsible in our buildings and operations. Building construction and renovation must comply with code requirements for energy efficiency and include sustainable features similar to those required for LEED Silver. Actual certification is optional and will be determined on an individual project basis.

Materials

Buildings should incorporate materials with long life and minimal maintenance needs.

Transparency

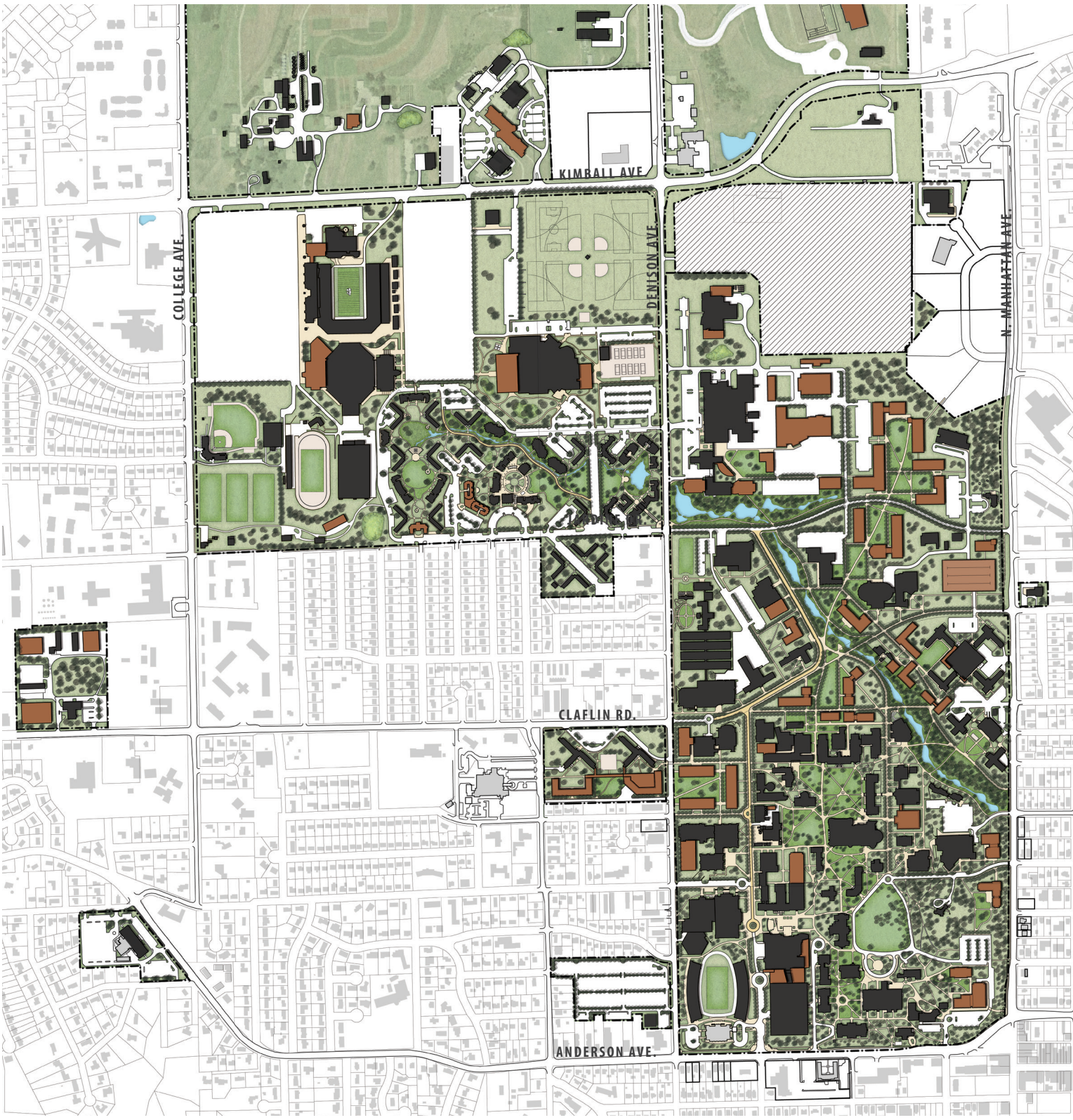
Buildings should avoid blank walls. Create a high level of transparency into the building to make it inviting and introduce daylight into the building to minimize the need for artificial lighting.

Landscape Design

The design quality of spaces between buildings is equally important to the design of the buildings themselves. Buildings should not be considered only as objects but as masses creating and defining outdoor rooms and spaces.

Master Plan

The Guiding Principles defined in the Campus Master Plan Update as: Strengthen Identity, Clarify Circulation, Leverage Program Adjacencies, and Promote Sustainability shall be applied in the evaluation of any construction project proposed for the campus.



CAMPUS MASTER PLAN ▲ EXISTING CAMPUS BUILDING PROPOSED CAMPUS BUILDING

CAMPUS ZONES

The K-State Campus is comprised of three distinct zones: the Historic Core, Mid-Campus and North Campus, as depicted in the attached Zone Map.

Historic Core

Most of the area south of Claflin Road. This area is defined by predominantly limestone buildings of 3 stories or fewer within a park-like, pedestrian-oriented campus setting. Building masses define a variety of outdoor spaces. The edges of the Historic core are often defined by stone walls and gateways.

Mid-Campus

The area north of Claflin Road and south of Kimball Avenue, has a lower density of buildings and lacks the spatial qualities of the historic core. The intent of the master pan is for future buildings to create more defined outdoor spaces, similar to the character of the Historic Core. Architectural styles are more varied but limestone and glass are the predominant exterior finish materials. This zone includes two areas with exceptions from standard guidelines, Athletics and Jardine.

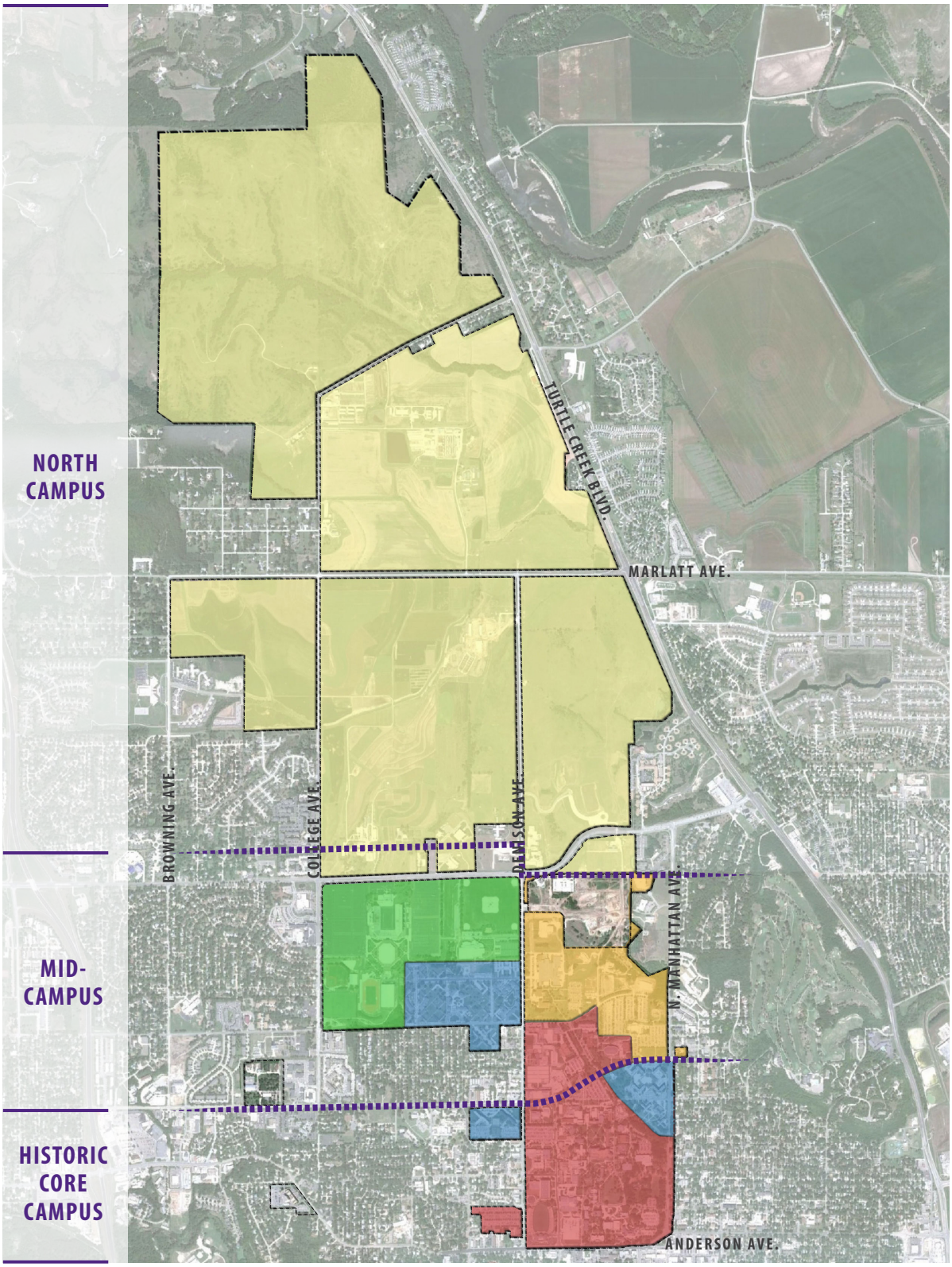
North Campus

The area north of Kimball Avenue. Buildings in this zone are predominantly agricultural in nature. They are constructed of a broader range of exterior finish materials but unified by selective use of color.

THE CAMPUS CORE IS THE MOST HISTORIC PART OF THE CAMPUS AND INCLUDES THE OLDEST BUILDINGS ON CAMPUS.

MAJOR CAMPUS ZONES & USES ▶

- PRIMARY ACADEMIC
- RESIDENTIAL
- VETERINARY AND RESEARCH
- AGRICULTURE, VETERINARY, AND RESEARCH
- ATHLETICS AND RECREATION
- ZONE DIVISION


NORTH CAMPUS
MID-CAMPUS
HISTORIC CORE CAMPUS
TURTLE CREEK BLVD.
MARLATT AVE.
BROWNING AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
ANDERSON AVE.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
CHARACTERISTICS			
PREDOMINANT LAND USE	Teaching, Research, and Student Life	Teaching, Research, and Student Life	Agricultural Teaching, Research
INTENDED LOOK & FEEL	Park-like campus	Park-like campus	Rural
MASSING & SPATIAL ORGANIZATION			
ALLOWABLE HEIGHT	Most buildings should be 4 stories or less, but taller buildings may be permitted near the perimeter of the Historic Core. Buildings in the environs of Anderson Hall shall be shorter than the primary roof line of Anderson Hall.	Taller buildings (over 4 stories) are permissible in this zone. Jardine: Taller buildings allowed Athletics: No height limit. Object buildings within open landscape.	No height limit
SPATIAL ORGANIZATION			
OPEN SPACE	Create a hierarchy of formal and informal open spaces including larger parks (such as Anderson Lawn), quads, courtyards, and malls. Create figurative outdoor rooms within the academic core that are framed by buildings. Provide a variety of environments such as woods, prairie, and gardens.	Intent for future development: Define formal and informal figurative open spaces, similar to Historic Core. Jardine: Create a hierarchy of formal and informal open spaces which build community by establishing residential neighborhoods, offering opportunities for gathering and recreation, and accommodating special events. Remove internal road networks to establish open spaces. Athletics: Create logical and clear circulation paths to major venue entrances from parking areas and adjacent zones.	Establish or maintain refined agricultural or natural settings for barns, research facilities, and out buildings.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
PLACEMENT & ORIENTATION	Locate new buildings to maintain the pedestrian experience of transitioning through a sequence of outdoor spaces or quads. Preserve view corridors to Anderson Hall Tower. Consider building orientation to optimize solar lighting and solar gain for energy efficient design and solar gain.	Locate new buildings in such a manner that the pedestrian experience of transitioning through a sequence of outdoor spaces or quads in the Historic Core is proliferated throughout the Mid-Campus zone. Consider building orientation to optimize solar lighting and solar gain for energy efficient design and solar gain.	Cluster buildings as functionally appropriate to create wind breaks, service yards, and needed adjacencies. Consider building orientation to optimize solar lighting and solar gain for energy efficient design and solar gain.
SPATIAL PLANNING CONCEPTS	Preserve quadrangles and Anderson "Oval" by not constructing any structures within them. Remove historically insignificant buildings that are inappropriately sited to create new quads and enhance the spatial quality of the campus. Noisy and unattractive cooling towers, fuel tanks, generators, etc. currently located along major pedestrian circulation paths should be relocated to more appropriate locations at the end of their serviceable lives.	Enhance spatial and pedestrian quality of campus by relocating parking lots to campus perimeter, removing internal streets and strategic placement of new buildings. Create quadrangles with thoughtful placement of buildings, and removal of parking and streets.	Prioritize agricultural zone for agricultural programs which incorporate interdisciplinary education, research, or outreach in agriculture.
GENERAL BUILDING DESIGN			
CHARACTER & IMAGE	Honor historic context; employ compatible architectural styles, material palette, texture, fenestration patterns and scale. New construction within the 500' radius of buildings on the historic register shall comply with State Historical society requirements.	Future development should replicate the density, spatial organization and park-like pedestrian quality of the historic core to the greatest extent feasible. Architectural styles may vary but the University's aesthetic continuity should be preserved with limestone and glass exterior wall finishes and comparably colored roofing materials.	Institutional quality development with a limited palette of exterior finish materials & colors will extend the University's identity and image while preserving and enhancing the natural beauty and rural character of the area.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
ACCESSIBILITY	All new construction must comply with ADA, other applicable accessibility codes, and should strive to use universal design principles. Consider placing classrooms and labs with high utilization on lower levels to accommodate class changes.	All new construction must comply with ADA, other applicable accessibility codes, and should strive to use universal design principles. Consider placing classrooms and labs with high utilization on lower levels to accommodate class changes.	All new construction must comply with ADA, other applicable accessibility codes, and should strive to use universal design principles. Provide accessible parking and unloading spaces at all new agricultural facilities.
BUILDING MASSING	Typically simple, complete, multistory volumes of formal rectangular plan and frequently with steep hipped or gabled roofs.	Typically simple, complete, multistory volumes of formal and informal rectangular plans, often with low sloped roofs and occasionally with steep hipped or gabled roofs.	Apply traditional agricultural settings to the arrangement of buildings.
EXTERIOR FINISH, MATERIALS & COLORS			
EXTERIOR WALLS	Exterior walls in the Historic Core are predominately pitched face, coursed ashlar limestone with smooth limestone accents. Exterior walls of new buildings in Historic Core should be contextually appropriate and constructed predominately of natural limestone and glass. For the Goodnow/Marlatt area, new construction may include elements to interface with the existing red brick buildings.	Natural limestone is the preferred exterior wall finish material in the Mid-Campus zone. A limited use of limestone-colored cast and pre-cast concrete, masonry, EFIS and limestone or warm medium gray metal panels is permitted with CP&FM approval. For Jardine housing, it is permissible to use durable engineered wood, concrete or composite siding in a broader range of approved colors.	A broader range of exterior wall finishes is permitted in the North Campus Zone, but exterior finish colors are limited to maintain aesthetic continuity. Acceptable exterior finish materials include natural limestone, limestone colored cast and pre-cast concrete, limestone or warm medium gray metal panels, masonry, stucco or exterior finish insulation system (EFIS) with CP&FM approval.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
ROOFING	Many of the Historic Core buildings have steep roofs with Campus Standard "Oxford Gray" architectural textured composition shingles. Other roofing materials such as slate, synthetic slate, or standing seam metal roofing in a similar warm medium gray color range may be used on sloping roofs with CP&FM approval. Low sloping roofs visible from other buildings should be light gray or vegetated. Strive to incorporate RoofPoint principles including durability, thermal discontinuity, energy efficiency, air barriers, daylighting, traffic protection, etc.	Visible sloping roofs should be a warm medium gray color similar to the Campus standard "Oxford Gray" architectural textured composition shingles. Campus standard MBCI "Ash Gray" color is preferred for standing seam metal roofs on utilitarian buildings and metal sided mechanical penthouse screen walls. Strive to incorporate RoofPoint principles including durability, thermal discontinuity, energy efficiency, air barriers, daylighting, traffic protection, etc.	Visible sloping roofs should be a warm medium gray color similar to Campus standard "Oxford Gray" architectural textured composition shingles. Campus standard MBCI "Ash Gray" color should be used for metal roofs on agricultural buildings . Strive to incorporate RoofPoint principles including durability, thermal discontinuity, energy efficiency, air barriers, daylighting, traffic protection, etc.
GLAZING AND DOOR & WINDOW FRAMES	Glass may range from clear to medium gray or medium bronze tones. Mirrored, dark tinted or colored glass is prohibited. Door and window frames may be clear anodized aluminum or gray/bronze tones.	Glass may range from clear to dark gray or bronze tones. Mirrored or colored glass is prohibited. Door and window frames may be clear anodized aluminum or gray/bronze tones.	Glass may range from clear to dark gray or bronze tones. Mirrored or colored glass is prohibited. Door and window frames may be clear anodized aluminum or gray/bronze tones.
SITE & GROUNDS			
CAMPUS EDGE SETBACKS	Maintain 100' green space along Anderson Ave and 50' along Manhattan and Denison Avenues.	Maintain 100' green space along Kimball Avenue and 50' along Denison Avenue.	Maintain 100' green space along Kimball and 150' along Denison, College, and Marlatt Avenues.
OUTDOOR SPACES	New construction and renovations shall include places for people to gather in plazas and include benches, trash receptacles bike parking, and lighting. Optional furniture may include tables, canopies or shade structures. In addition to pedestrian accommodations, bike parking facilities shall be provided in approved locations.	New construction and renovations shall include places for people to gather in plazas and include benches, trash receptacles bike parking, and lighting. Optional furniture may include tables, canopies or shade structures. In addition to pedestrian accommodations, bike parking facilities shall be provided in approved locations.	Establish quality Kansas typical environments in a range of primary and out buildings. Cluster buildings as functionally appropriate to create wind breaks and service yards. In addition to pedestrian accommodations, bike parking facilities shall be provided in approved locations where desired.

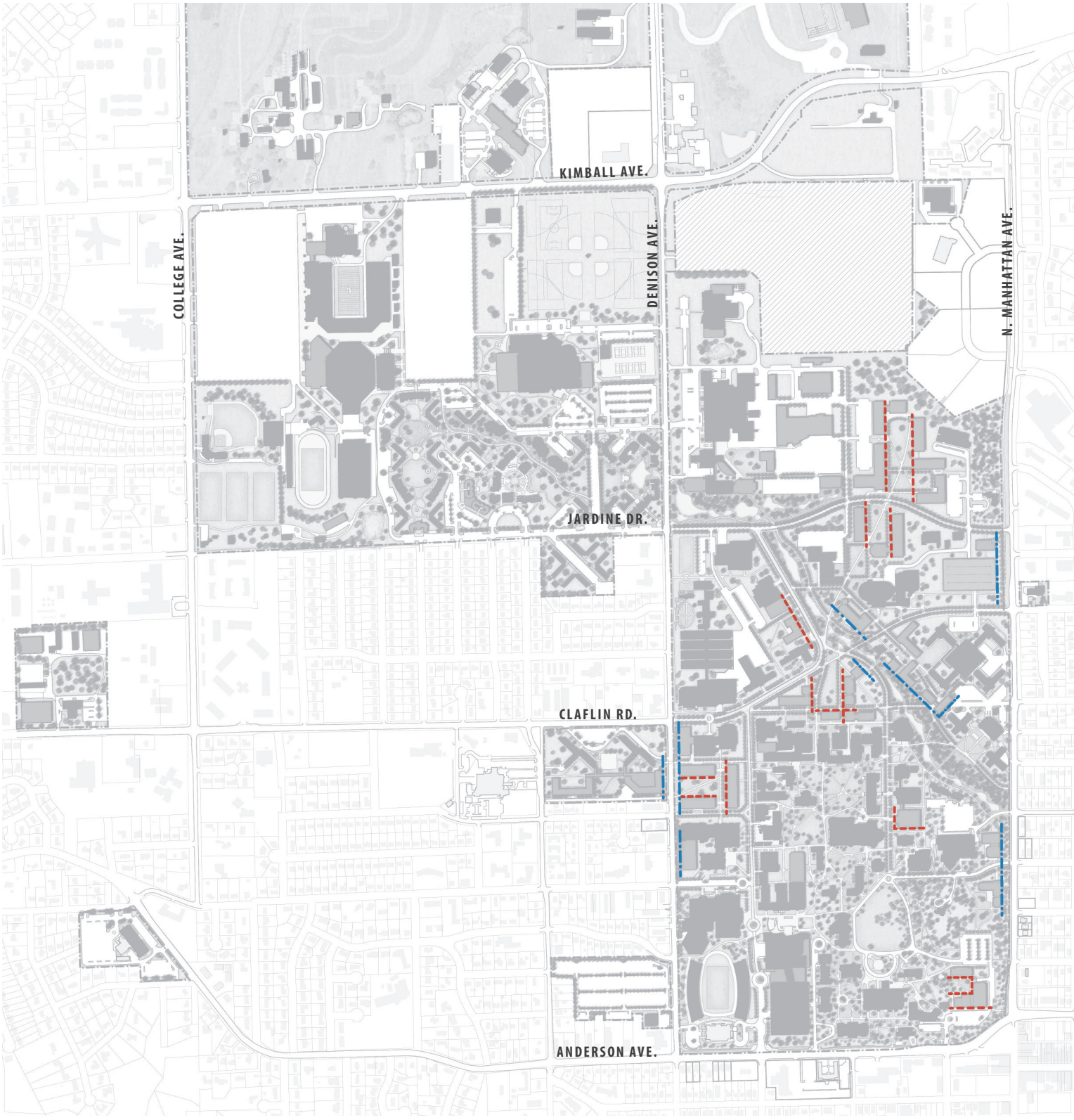
	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
LANDSCAPING	Provide thoughtful selection of trees, shrubs, perennial and annual materials to enhance the campus aesthetic and climatic environment. Consult Landscape Guidelines.	Provide thoughtful selection of trees, shrubs, perennial and annual materials to enhance the campus aesthetic and climatic environment. Consult Landscape Guidelines.	Consult Landscape Guidelines.
DUMPSTERS, GROUND-MOUNTED INFRASTRUCTURE & EQUIPMENT	Placement and design of service areas, waste dumpsters, recycling receptacles, and ground mounted equipment such as transformers, generators, cooling towers, condensing units, etc. must be coordinated and approved by the University Landscape Architect. No overhead utilities permitted. Every effort shall be made to screen these elements with plant materials and fencing. Relocate unattractive and noisy ground-mounted infrastructure and equipment currently located along major pedestrian paths at the end of serviceable equipment life to less prominent locations.	Placement and design of service areas, waste dumpsters, recycling receptacles, and ground mounted equipment such as transformers, generators, cooling towers, condensing units, etc. must be coordinated and approved by the University Landscape Architect. No overhead utilities permitted. Every effort shall be made to screen these elements with plant materials and fencing.	Placement and design of service areas, waste dumpsters, recycling receptacles, and ground mounted equipment such as transformers, generators, cooling towers, condensing units, etc. must be coordinated and approved by the University Landscape Architect. No overhead utilities permitted.
SITE FURNITURE	Provide a consistency in color and materials for benches, waste receptacles. Current standards call for black metal site furniture.	Provide a consistency in color and materials for benches, waste receptacles. Current standards call for black metal site furniture.	
WALLS & FENCING	Preserve existing stone walls around campus core. Continue stone wall along Denison Avenue. Provide contextually appropriate limestone walls with vertical black steel picket fencing to secure and screen dumpsters and mechanical equipment. Chain link fencing is not permitted.	Limestone walls with vertical black steel picket fencing should be provided to define or secure outdoor areas when required, and to screen dumpsters and mechanical equipment. Chain link fencing is permitted in limited applications such as for recreation or security.	Develop attractive multi-species design standard for animal containment fencing along city and county streets. Functionally appropriate fencing of any type is permitted in remote rural areas.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
EXTERIOR LIGHTING	Pedestrian walk and street lighting shall be illuminated to EIS standards and conform to adjacent fixture and pole styles. Parking lot and other security lighting shall be illuminated according to EIS standards and incorporate night sky and cutoff features. Banners may be incorporated with light poles. LED fixtures preferred. No high pressure sodium fixtures permitted. Wall pack lighting is discouraged. Poles shall be of historic character.	Pedestrian walk and street lighting shall be illuminated to EIS standards and conform to adjacent fixture and pole styles. Parking lot and other security lighting shall be illuminated according to EIS standards and incorporate night sky and cutoff features. LED fixtures preferred. No high pressure sodium fixtures permitted.	Security lighting to incorporate night sky and cutoff features. No high pressure sodium fixtures permitted. Parking lot and walk lights to conform to Mid-Campus lighting standards.
GATEWAYS & ENTRY FEATURES	Defined by limestone walls, columns, and black steel picket fencing/ gates to include scale appropriate "Kansas State University" sign. Kiosk directories placed near pedestrian entries. Placement as defined by Signage & Wayfinding Guidelines.	Defined by limestone walls and black steel picket fencing/gates to include scale appropriate "Kansas State University Sign". Kiosk directories placed near pedestrian entries.	Gateways at entrances to remote buildings or complexes should be similar to Large Animal Research Center Gateway. In the North Campus Zone, signs for buildings or complexes of buildings may often include departmental or complex name with "Kansas State University.
SIGNAGE	Refer to Signage and Wayfinding Guidelines available from Campus Planning and Facilities Management for identification, directional and directory signs. Powercat or similar logos are not permitted. All signage must be approved by CP&FM.	Core campus sign applications apply. Exception: the use of the Powercat (only on Athletics buildings and signage) or Rec Center logo (only on Rec Center building and signage) is permitted. All signage must be approved by CP&FM.	Signage at entrances to remote buildings or complexes should be integrated into gateway/ entry features (similar to Large Animal Research Center). Signage is at a larger scale to permit readability from greater distances in faster moving vehicles. All signage must be approved by CP&FM.
STORMWATER MANAGEMENT	The campus stormwater management is seen as an interlocked system which accommodates the quantity and quality of runoff such that there is no increase in stormwater runoff from the campus. The system may include green roofs, rainwater gardens, cisterns, permeable pavement, etc developed in support of the Campus Stormwater Management Study.	In addition to the core campus applications, storm water control practices may include detention basins.	In addition to the core campus applications, storm water control practices may include detention basins.

	HISTORIC CORE	MID-CAMPUS	NORTH CAMPUS
CAMPUS CIRCULATION			
MULTI-MODAL TRANSPORTATION	Primarily pedestrian-oriented, with provisions for bicycle traffic. Bike parking facilities shall be provided in approved locations and coordinated with bike routes. Incorporate master plan concepts for routes, minimizing conflicts with pedestrians. Bus and automobile traffic accommodated on perimeter streets, with some access roads into campus. Most on-campus vehicular traffic limited to service vehicles. Always make limited access accommodations for emergency, accessibility transportation, service and delivery vehicles such that private vehicle access is limited.	Provide sidewalk and bicycle infrastructures to encourage walking and riding bikes. Bike parking facilities shall be provided in approved locations and coordinated with bike routes. Incorporate master plan concepts for routes, minimizing conflicts with pedestrians. Bus and automobile traffic accommodated on perimeter streets, with some access roads into campus. Most on-campus vehicular traffic limited to service vehicles. Always make limited access accommodations for emergency, accessibility transportation, service and delivery vehicles such that private vehicle access is limited.	Provide sidewalk and bicycle infrastructures to encourage walking and riding bikes along primary transportation corridors. Bike parking facilities shall be provided in approved locations and coordinated with bike routes. Incorporate master plan concepts for routes, minimizing conflicts with pedestrians. Bus and automobile traffic accommodated on perimeter streets, with some access roads into campus.
PARKING	Relocate private and State vehicle parking from the core campus areas to the campus edges. Screen parking with plant materials according to the landscape guidelines.	Screen parking with plant materials according to the landscape guidelines.	Screen parking with plant materials according to the landscape guidelines.
PERIMETER STREETS	Provide consistent concrete sidewalks and appropriate, consistent lighting for pedestrian and automobile safety. Provide bike lanes, paths or routes as appropriate. Street trees at regular spacing approved by the University Landscape Architect, and, where applicable, City of Manhattan standards.	Campus edge streets with sidewalks, bike lanes or paths and appropriate fencing as needed, clear gateways and entrances as needed, with appropriate level of security and signage, and street trees at campus gateways.	Rural street with appropriate and consistent fencing as needed, clear gateways and entrances with appropriate level of security and signage, street trees and campus gateways.

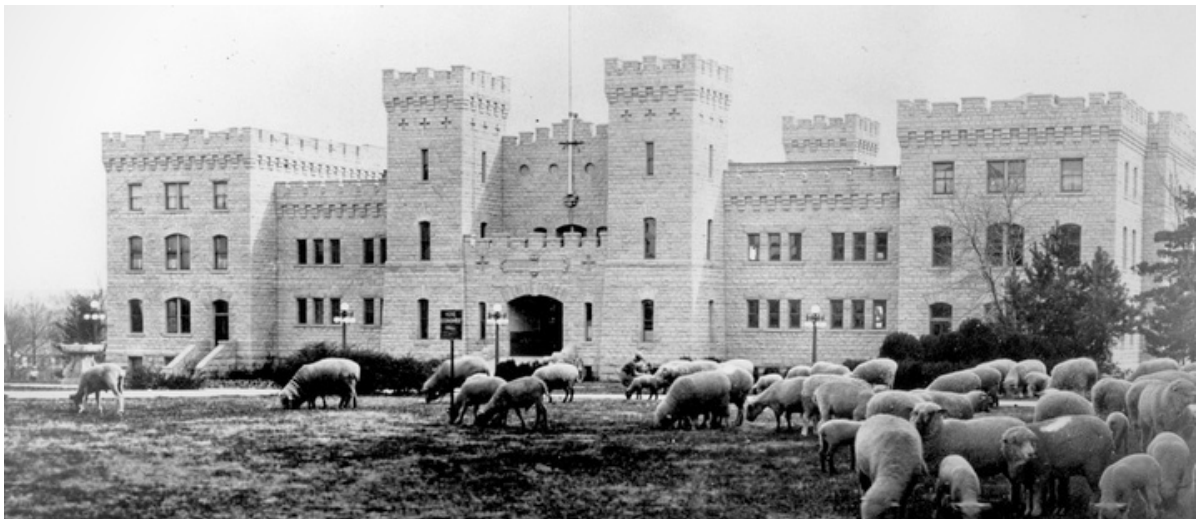
Proposed Build-To & Setback Lines

Build-to and setback lines help define and bound important proposed open spaces and key setback distances that should be respected as the Campus Master Plan is implemented.



PROPOSED BUILD-TO/SETBACK LINES ▲ SETBACK LINE BUILD-TO LINE

THE CAMPUS LANDSCAPE OF KANSAS STATE UNIVERSITY EXPRESSES A DIVERSE LAND GRANT MISSION THAT INCLUDES EDUCATION, RESEARCH, AND SERVICE. FROM ITS FOUNDING AS AN INSTITUTION IN THE FLINT HILLS NATIVE PRAIRIE, THE CAMPUS HAS EVOLVED TO BECOME A LIVING LABORATORY WITH A VARIETY OF BEAUTIFUL PLACES, FUNCTIONS, AND CHARACTERS WHICH ADDRESS THE CAMPUS' HISTORY, LOCATION, AND MISSION. FUTURE CAMPUS IMPROVEMENTS SHOULD STRIVE TO HONOR THIS DIVERSITY AND VARIETY IN A SUSTAINABLE MANNER.



THE GROUNDS HAVE LONG SERVED AS A LIVING LABORATORY FOR STUDENTS AND FACULTY

HISTORY OF CAMPUS LANDSCAPE

Kansas State University, formerly Bluemont College, was founded in 1858. In 1863, the institution became a land grant college whose primary purpose was to research and determine which plants could be cultivated and grown in the Kansas Prairie landscape and to provide the information to the general public.

As a primary feature of the campus landscape, ***shelterbelts*** also referred to as windbreaks, provided an essential function for the landscape of the campus by protecting human habitat, agricultural lands and livestock from winter and summer winds. Shelterbelts consisted of native and common varieties that would give protection for more select tree species in future plantings.

Among the research conducted on campus, a central focus was Horticulture. The primary objective of campus research at the time was to test the adaptability of eastern tree species in the Kansas landscape. Other important research included: grain, fertilizer, tilling, feeding, animal production and milk production. Much of the historic tree canopy was planted not as a part of an organized landscape plan, but incrementally as an experimental nursery of trees and shrubs. Because of this, the landscape was more of an evolutionary one, taking advantage of opportunities to enhance the campus as they came about.

Today, the campus is an arboretum with a wide variety of well-established tree species, shrubs, perennials and grasses that is to be replicated, adapted and preserved where appropriate. The campus has an established "tree walk" that should be maintained and enhanced.

Historic Forest Palette (1872)

European Larch
Deciduous Cypress
White Ash
Green Ash
Red Ash
Osage Orange
Catalpa
Tree of Heaven
Black Walnut
White Hickory
Soft Maple
Willow

THE CORNER OF ANDERSON AVENUE AND NORTH MANHATTAN AVENUE, POST 1885

VIEW OF THE CAMPUS FROM WHAT IS NOW AGGIEVILLE, 1885

THE CAMPUS HOSTS A VARIETY OF BEAUTIFUL PLACES, FUNCTIONS, AND CHARACTER.

LANDSCAPE GUIDELINES PRINCIPLES

These themes are carried throughout the campus Landscape Guidelines and serve as the guide to physical development of the open and green spaces of the campus. Any improvement to the campus landscape should:

Strengthen Identity

- Active open spaces are beautiful, comfortable, navigable, and part of an identifiable hierarchy from formal to semi-formal to informal reflecting university identity and pride.
- Enhancements are historically respectful, presently relevant and forward-thinking.
- Unify the campus through the use of materials, plant selection and space design.

Leverage Program Adjacencies

- Foster educational environments by incorporating living laboratories that serve as functional landscapes for use by faculty, staff, and students.
- Cultivate landscapes for learning, research, and recreation in proximity to buildings with related programs.
- Enhance visibility of the campus arboretum resources; pursue Tree Campus USA designation.

Promote Sustainability

- Preserve or enhance natural systems and promote sustainable landscapes, as reflected in *K-State 2025* and Campus Master Plan Update 2012.
- Consider multi-seasonal use and aesthetics in any campus landscape design.

CAMPUS-WIDE LANDSCAPE GUIDELINES

Some standards apply campus-wide that are to be reviewed for any project occurring on campus grounds. Refer to page 146 for map of campus zones and land uses.

Plant Selection

Plants for the campus landscape should be selected to enhance the beauty of the campus as well as supporting a sustainable landscape. Selecting native, low-maintenance plants is preferred. Occasionally there will be opportunity for selecting non-native plant material to expand diversity and educational exploration. For the most up-to-date lists of appropriate plants, refer to the Kansas State Horticulture, Forestry and Recreation Resources online references (www.hfrr.ksu.edu). Select plants based on micro climate, and use.

Irrigation Recommendations

Irrigation is an important functional component of the campus landscape and can greatly impact the success of plant material. To improve efficiency of irrigation systems on campus recommendations are as follows:

A. Connect isolated systems.
B. Install more efficient systems as existing facilities age or are damaged.
C. Consider the use of alternative water sources such as: (a) rainwater capture through cisterns, rain barrels, sub-surface, (b) greywater from adjacent buildings, and/or (c) condensation from chillers and coolers. These represent only a few options available, new technologies and practices should be considered.
D. Where appropriate, consider the use of drought tolerant/low water use plants into the landscape and irrigate only in times of severe drought.

Memorials and Art

Campus features including memorials and art can add to the landscape and are encouraged on the campus. Art installations require review by the Sculpture Committee as well as an endowment for maintenance and care for the piece.

Wayfinding and Signage

Provide signage in campus spaces to promote campus brand and identity and aid in wayfinding through the campus for visitors. Refer to the Wayfinding and Signage standards of the Campus Master Plan Update 2012.

Sidewalks and Pathways

Provide adequate lighting levels for pedestrians (in compliance with IES Standards), particularly in the Historic Core Campus and Mid-Campus.
Provide universally accessible routes through campus, per most current ADA Standards. Path design and size to be appropriate to level of use, providing a hierarchy of connections through the campus.

Site Furnishings

Site furnishings should provide uniformity and are appropriate to the context/use of space. For the most up-to-date recommendations for site furnishings including tables, benches, trash receptacles, light fixtures and bicycle racks contact the University Landscape Architect at Campus Planning and Facilities Management (CP&FM).

CAMPUS ZONES AND USES

The Manhattan campus is made up of three distinctive zones: the Historic Core Campus, Mid-Campus, and the North Campus. The Historic Core Campus was the area first developed for academic use and includes the oldest buildings on campus. On the west side of the Historic Core Campus, the Kramer Complex consists of traditional residence halls and a dining center. On the east side, the Derby and Strong complexes comprise traditional residence halls and suites, as well as two dining centers. This zone also comprises the majority of the academic undergraduate experience.

The Mid-Campus is located between the Historic Core Campus and Kimball Avenue. This area is home to the College of Veterinary Medicine and is immediately adjacent to the 25-acre KSU Research Park and the National Bio and Agro-Defense Facility. Jardine Apartments are located west of Denison Avenus in this zone. An area of athletics and recreation use between Denison and College Avenues and south of Kimball Avenue provides facilities for the more active aspects of campus life.

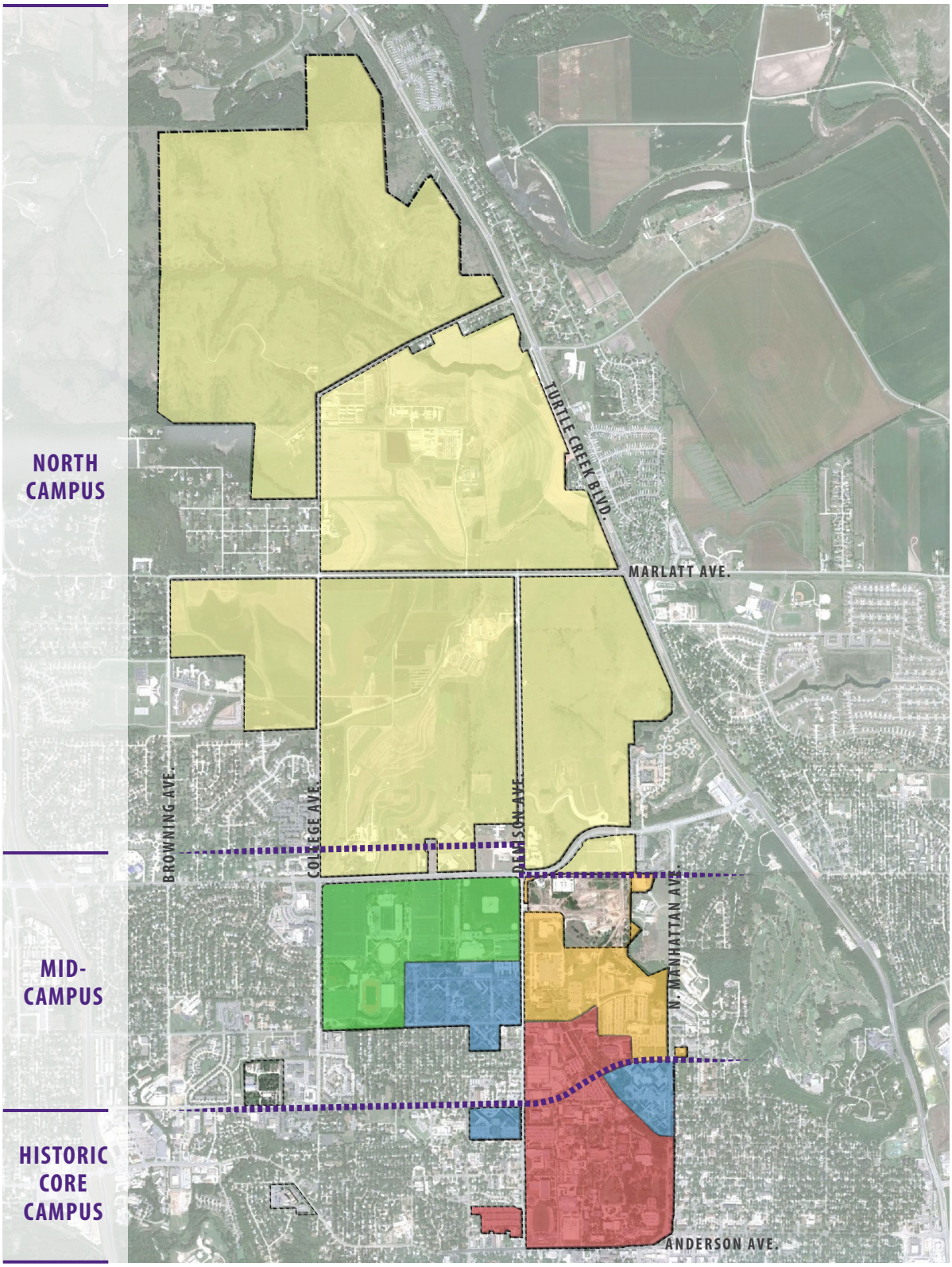
North of Kimball Avenue is the North Campus. This zone of the campus is mostly used for agricultural, veterinary, and research activities.

The guidelines included in this appendix apply to landscapes in all three of zones. More detailed guidelines specific to individual campus zones can be found in the Landscape Design Guidelines.

EACH CAMPUS ZONE CONTRIBUTES TO THE OVERALL UNIVERSITY EXPERIENCE.

MAJOR CAMPUS ZONES & USES ▶

- PRIMARY ACADEMIC
- RESIDENTIAL
- VETERINARY AND RESEARCH
- AGRICULTURE, VETERINARY, AND RESEARCH
- ATHLETICS AND RECREATION
- ZONE DIVISION


NORTH CAMPUS
MID-CAMPUS
HISTORIC CORE CAMPUS
TURTLE CREEK BLVD.
MARLATT AVE.
BROWNING AVE.
COLLEGE AVE.
DENISON AVE.
N. MANHATTAN AVE.
ANDERSON AVE.

LANDSCAPE TYPOLOGIES

The following landscape typologies help shape the campus environment while contributing to the quality of life on campus. Adhering to the guidance provided for each typology will not guarantee success. The design team, in collaboration with a supportive institutional client, will bring more to a specific project than can be expressed in this set of guidelines.

Edges and Entrances

The edges and entrances define physical boundary and transition between campus and surrounding community while creating visually inviting spaces that provide a positive, welcoming first impression to campus visitors.

Quadrangles

A typical campus quadrangle is characterized by large open green spaces that are iconic, enhancing the identity of the institution. These spaces provide gathering opportunities for both ceremonial and impromptu events. Pedestrian routes provide direct routes to, through and/or around the green space.

Pedestrian Malls

A pedestrian mall is typically a street that has been converted from vehicular to pedestrian/bicycle-only circulation (as well as emergency access and ADA shuttle). It provides important connections from one area of the campus to another, flexible arrangement of space, and serves as an iconic experience for the campus.

Plazas

Plazas are characterized by a large expanse of hardscape that supports pedestrian traffic into building entrances, outdoor dining, and/or event spaces. It is important to maintain flexible programming opportunities to promote a sense of community for the space, incorporating a mix of fixed and moveable seating. The use of art, sculpture, temporary exhibits and/or water features is encouraged as is appropriate to site context.

Courtyards

Courtyards are typically smaller, more intimate gathering spaces that are enclosed, at least partially by buildings and generally serve the buildings they are adjacent to. These spaces are often planted with a more diverse range of plant species that cannot be planted in more open areas.

Campus Green Space

Campus green spaces are quality landscapes that may be preserved as the campus is developed. It also includes undeveloped areas with minimal landscaping.

Woodland Habitats and Riparian Corridors

Woodland and riparian habitats are typically within or adjacent to streams and creeks and provide a natural setting among more developed areas of campus. These areas also provide natural stormwater management and wildlife habitat, serving as a functional amenity for the campus.

Playing Fields

Large areas of artificial turf used for intramural sports, each demanding specific maintenance requirements. Playing fields may also occur as open spaces adjacent to or within the campus core.

Agricultural Research Lands

The lands to the north provide hands-on learning opportunities near to the Campus Core. These lands are a valuable resource for the University and are being used for departmental research, remaining true to the land grant mission.

Surface Parking

Typically, surface parking in the Historic Campus Core and Mid-Campus consists of smaller lots, adjacent to buildings, that are used primarily for ADA accessibility or loading/unloading.


KIMBALL AVE.
NBAF
JARDINE DR.
COLLEGE AVE.
DENISON AVE.
MANHATTAN AVE
CLAFLIN AVE.
ANDERSON AVE.
CAMPUS TYPOLOGIES ▶
PRIMARY ENTRANCE
SECONDARY ENTRANCE/RESEARCH AREA ID
SECONDARY EDGE
QUADRANGLE
MAJOR PEDESTRIAN SPINE
PEDESTRIAN MALL
PLAZA
COURTYARD
WOODLAND/RIPARIAN
AGRICULTURAL/RESEARCH LANDS
SURFACE PARKING
PLAYING FIELDS
CAMPUS GREEN SPACE
PROPERTY LINE

LANDSCAPE DESIGN GUIDELINES QUICK REFERENCE GUIDE

Guiding Principles

Every aspect of physical development of the campus should occur in a way that will; 1) strengthen identity, 2) leverage program adjacencies, 3) clarify circulation, and 4) promote sustainability as is consistent with the Campus Master Plan.

DESCRIPTION		GUIDANCE		PRIMARY ACADEMIC	VETERINARY	RESIDENTIAL	ATHLETICS	NORTH CAMPUS
EDGES & ENTRANCES								
• Define physical boundary • Identify transition from community • Inviting, positive first impression • Landscape forms identity & sense of place for university	ENTRANCES	PRIMARY	SECONDARY					
		Appropriate materials:	Appropriate materials:					
		Kansas native limestone gate	Kansas native limestone gate	●	●	●	●	
		Kansas native limestone wall	Kansas native limestone wall	●	●	●	●	
		Kansas native limestone posts/accents	Kansas native limestone posts				●	●
		Cast stone accents	Cast stone accents	●	●	●	●	
		Black wrought iron	Black wrought iron	●	●	●	●	●
		White rail fence	White rail fence					●
		Formal entry plantings of shrubs, perennials & trees	Accent plantings of shrubs & perennials	●	●	●	●	
		Informal plantings of shade trees	Naturalized plantings of shrubs & perennials					●
		Simple plant palette in formal arrangements					●	
		Identify entry to campus	Identify use/area of research facilities	●	●	●	●	●
		Scale of entrances appropriate to enlarged scale of buildings & facilities					●	
		Primary Entrances to be well-designed and monumental in scale		●	●	●	●	●
	EDGES	Rural-like, but uniform edges						●
		Consistent shade tree canopy along edges		●	●	●		
		Intermittent shade tree canopy along edges, where appropriate					●	●
		Shelterbelts along edges, where appropriate					●	●
		Consider use of warm season turf grasses along edges					●	●
		Signage consistent with wayfinding guidelines		●	●	●	●	●
		Provide appropriate level lighting for multi-purpose (signing, safety & circulation)		●	●	●	●	●
QUADRANGLES								
• Large open green space • Iconic, enhancing identity of the institution • Direct pedestrian routes through and/or around • Provide ceremonial and impromptu gathering opportunities		Traditional turf as lawn		●	●	●		
		Formal foundation plantings of shrubs & perennials		●	●	●		
		Formal plantings of shrubs & perennials at focal points		●	●	●		
		Shade trees		●	●	●		
		Minimal stormwater management (rain gardens, ornamental bio-swales) where appropriate		●	●	●		
		Provide appropriate level lighting for multi-purpose (signing, safety & circulation)		●	●	●		
		Consistent site furnishings (re: Campus Planning & Facilities Management Office Standards, CPFM)		●	●	●		
		Consider pedestrian safety in selection & placement of plant material		●	●	●		

DESCRIPTION	GUIDANCE	PRIMARY ACADEMIC	VETERINARY	RESIDENTIAL	ATHLETICS	NORTH CAMPUS
PEDESTRIAN MALLS						
• Typically a street converted to ped/bicycle-only traffic • Maintain handicap/ emergency access • Provide important connection • Iconic • Flexible arrangement of space for special events.	Construct with pedestrian-scale permeable pavements	●	●	●		
	Include site furnishings (benches, trash, lighting, bike racks, etc.) ref. CP&FM Office Standards	●	●	●		
	Street trees spaced evenly	●	●	●		
	Wayfinding and signage consistent with guidelines	●	●	●		
	Improvements allow for handicap/emergency access	●	●	●		
	Provide appropriate level lighting for multi-purpose use (signing, safety & circulation)	●	●	●		
	Consider pedestrian safety in selection & placement of plant material	●	●	●		
PLAZAS						
• Large expanse of hardscape • Flexible programming; promote sense of community • Fixed or movable seating • Temporary art exhibit	Edge plantings of shrubs, perennials & trees around perimeter of plazas; consider the use of complimentary rain gardens where appropriate	●	●	●		
	Provide occasional breaks in pavement to soften with shade trees, shrubs/perennial beds or rain gardens as appropriate	●	●	●		
	Entrances to buildings/venues to be "high design" consisting of simple plant palette in formal arrangements	●	●	●	●	
	Provide fixed and movable seating opportunities	●	●	●	●	
	Designed to support adjacent programs/department activities	●	●	●	●	
	Design and site elements (such as sculptures and water features) promote University branding and identity	●	●	●	●	
	Provide opportunities for sculpture display	●	●	●	●	
	Construct using permeable pavements appropriate to use	●	●	●	●	
	Human Comfort Considerations (i.e. water features and shade)	●	●	●	●	
	Consider pedestrian safety in selection & placement of plant material	●	●	●	●	
	Site lighting and furnishings to match Campus Standards (re: CP&FM Office Standards)	●	●	●	●	
COURTYARDS						
• Small, intimate gathering spaces • Typically enclosed at least partially by buildings • Fixed or movable seating • Used for outdoor classroom space • Use of diverse plantings	Seating arrangements designed for intimate gatherings	●	●	●		
	Extend adjacent academic uses in to the space	●	●			
	Consider rain gardens, cisterns, rain barrels, etc. as appropriate	●	●	●		
	Construct using permeable pavements appropriate to use	●	●	●		
	Consider pedestrian safety in selection & placement of plant material	●	●	●		
	Site lighting and furnishings to match Campus Standards (re: CP&FM Office Standards)	●	●	●		

DESCRIPTION	GUIDANCE	PRIMARY ACADEMIC	VETERINARY	RESIDENTIAL	ATHLETICS	NORTH CAMPUS
WOODLAND / RIPARIAN CORRIDOR						
• Typically within or adjacent to streams & creeks • Natural setting among developed land uses • Provides natural stormwater management & wildlife habitat • Serves as a functional amenity	Remove structures that inhibit Campus Creek's ability to function hydrologically	●	●	●		
	Provide space for outdoor classrooms	●	●	●		
	Reduce invasive plant species	●	●	●		
	Daylight Campus Creek where possible	●	●	●		
	Incorporate in-line and off-line stormwater detention areas	●	●	●		
	Pedestrian access paths along corridor	●	●	●		
	Site lighting and furnishings to match Campus Standards (re: CP&FM Office Standards)	●	●	●		
	Provide appropriate lighting levels along paths	●	●	●		
AGRICULTURAL / RESEARCH LANDS						
• Provides hands-on learning opportunities • Lands used for departmental research	Maintain research activity near the campus core					●
	Continue sustainable initiatives concerning land management, rotational grazing, composting & stormwater					●
	Reduce invasive plant species					●
	Site lighting and furnishings to match Campus Standards (re: CP&FM Office Standards)					●
SURFACE PARKING						
	Perimeter landscape buffer strip (min. 15' wide, 20' when sidewalk is present)	●	●	●	●	●
	fescue turf	●	●	●		
	native turf				●	●
	shade trees	●	●	●	●	
	stormwater features (curb cuts, rain gardens, bio-swales)	●	●	●	●	
	sidewalks	●	●	●	●	
	Interior landscape islands (min. 8' wide) equal to at least X% of total parking lot area.	10%	10%	10%	4%	NA
	native or fescue turf				●	
	shrubs/perennials	●	●	●	●	
	shade trees	●	●	●	●	
	stormwater features (curb cuts, rain gardens, bio-swales)	●	●	●	●	
	Construct using permeable pavements as appropriate	●	●	●	●	●
	Construct temporary lots using edged gravel					●
	Consider under-pavement storage of rain water (used for irrigation or infiltration), where appropriate	●	●	●	●	
	Consider pedestrian safety in selection & placement of plant material	●	●	●	●	●
	Site lighting and furnishings to match Campus Standards (re: CPFM Office Standards)	●	●	●	●	●

DESCRIPTION	GUIDANCE	PRIMARY ACADEMIC	VETERINARY	RESIDENTIAL	ATHLETICS	NORTH CAMPUS
PLAYING FIELDS						
• Large areas of artificial or natural turf used by campus sports • Open spaces adjacent to or within the campus core	Incorporate under-field storage of rain water to be used for supplemental irrigation	●			●	
	Investigate innovative methods/technologies to reduce the need for potable water in irrigation	●			●	
	Install quality artificial turf where appropriate	●			●	

THE SIGNAGE & WAYFINDING MASTER PLAN GUIDES THE ADDITION OF DIRECTIONAL SIGNS ON THE MANHATTAN CAMPUS. THE SYSTEM COMPLEMENTS EXISTING CAMPUS SIGNS. THE FOLLOWING IS A BRIEF SUMMARY OF THE GUIDELINE. FOR A COMPLETE DESCRIPTION REFER TO THE *SIGNAGE & WAYFINDING MASTER PLAN – FALL 2012*. THIS DOCUMENT PRESENTS DESIGN, MESSAGE AND PLACEMENT CRITERIA AND METHODOLOGIES FOR THE ORGANIZATION OF SIGN MESSAGES AND PROGRAMMING.

WAYFINDING METHODOLOGY

The system of wayfinding messages reinforces the brand by delivering clear and simple navigational guidance. A consistent message hierarchy meets current and future wayfinding needs.

Advance and Supplemental Wayfinding

Advance Wayfinding begins prior to arrival. It is the policy of Kansas State University to provide effective advance wayfinding information to facilitate the visitor experience and reduce the navigational burden on the signage system. The University provides printed and online maps and brochures for prospective visitors.

Sign Messaging Hierarchy

On-campus wayfinding information is designed for infrequent visitors. Signs cannot and should not list all possible destinations. This would result in confusion for visitors looking for the highest level of information only. A hierarchy of destinations is applied to the University's wayfinding program based on importance to visitors, new students and people unfamiliar with campus. The following methods apply to the implementation of wayfinding messages.

VEHICULAR MESSAGES

The objective of vehicular signage is to direct motorists first to the appropriate campus districts then to more specific destinations within. Vehicular districts include Main Campus, Athletics Complex, Veterinary Medicine and North Campus. The "Regional Secondary Destinations" within each district are limited to those identified by the Task Force as most relevant for visitors and where parking, additional information, or designated drop-offs are available. Districts and Regional Secondary Destinations are listed on the next page.

All destinations listed on vehicular signs are organized by direction. For example, all destinations requiring a left turn are grouped together. This is the left "directional group" and it is preceded by a left arrow. Directional groups always occur in a specific order– left, right, and straight ahead. Consistently listing directional groups in the same order from sign to sign improves wayfinding and reduces the amount of time required for a motorist to read and react to the sign. Likewise, turns are listed before straight-ahead destinations since turns require a more immediate action.

PEDESTRIAN DIRECTIONAL MESSAGES

Similar priorities are established for pedestrian directional signage; these signs give guidance to key destinations that are also organized into three primary directional groups – left, right, and straight. As with vehicular messages, the groups are consistently listed in this order and preceded by the appropriate arrow.

The destinations on pedestrian directional signs are limited to those most relevant to visitors and people who are new to campus. The goal is not to list every building on each sign; rather, it is to help those unfamiliar with campus navigate preferred routes to key destinations.

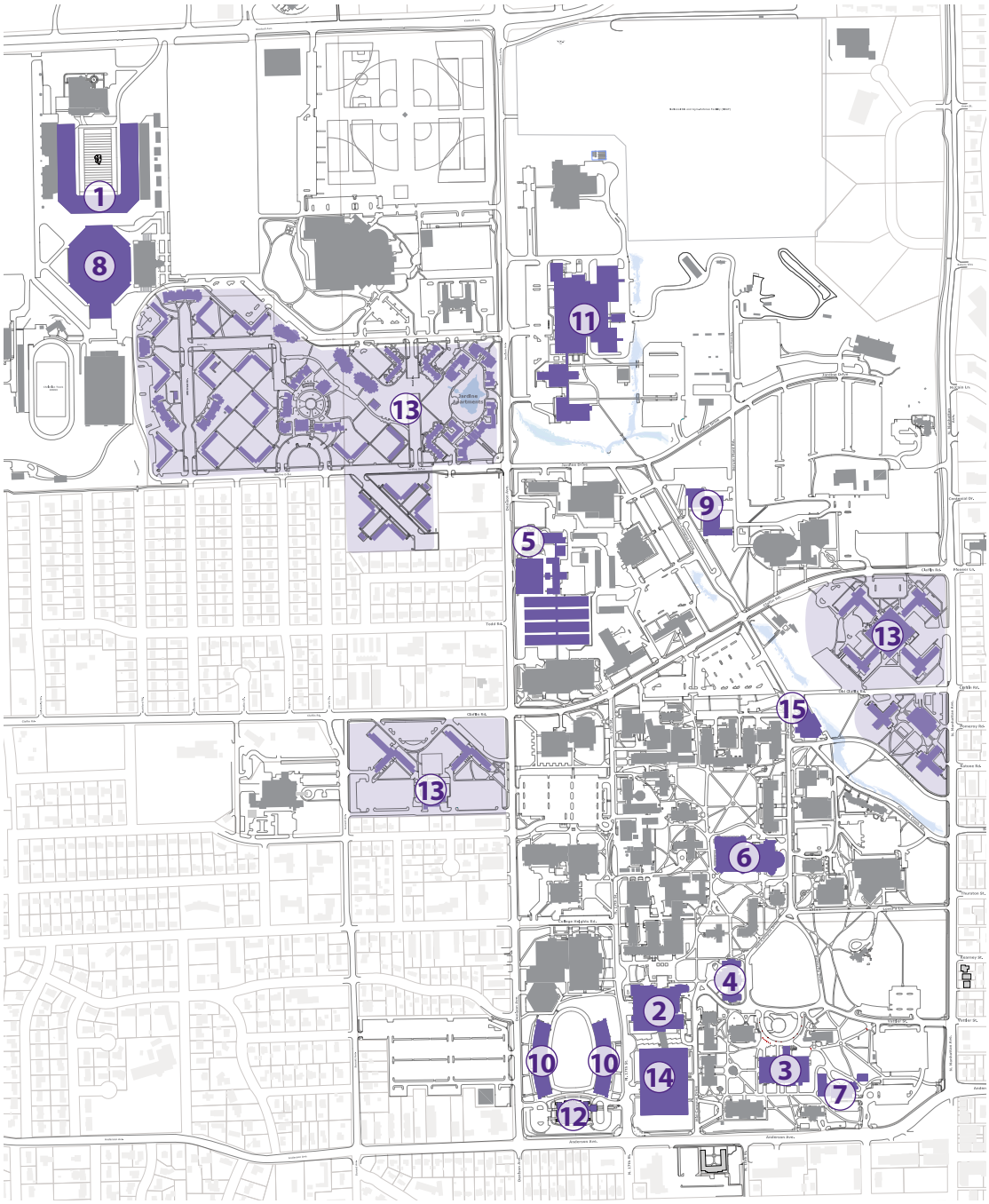
Pedestrian directional signage is concentrated in the historic core of campus. The destinations listed on a sign will not exceed a 10 minute walking duration from that location.

ORIENTATION MAPS

Map kiosk signs contain a campus map and directory. The pedestrian wayfinding system depends on them to provide visitors a way to find all campus facilities, not just those on directional signs. They are placed at transition points from vehicular to pedestrian travel (such as parking lots, bus stops, and drop off areas), near major public facilities, and along designated paths of pedestrian travel signs. They include a "You Are Here" marker–an important orientation tool.

DESTINATION MESSAGES

Identification signs are destination markers. They indicate arrival. Messages include the name of the facility, field, or lot and should not include additional directional information.



▲ KEY WAYFINDING DESTINATIONS ARE THOSE MOST SOUGHT BY PROSPECTIVE STUDENTS, VISITORS AND COMMUNITY

KEY DESTINATIONS

01 BILL SNYDER FAMILY STADIUM
02 STUDENT UNION
03 MCCAIN AUDITORIUM
04 ANDERSON HALL
05 GARDENS AND CONSERVATORY
06 HALE LIBRARY
07 BEACH MUSEUM
08 BRAMLAGE COLISEUM
09 CALL HALL
10 EAST (FUTURE VISITOR CENTER) AND WEST MEMORIAL STADIUM
11 VETERINARY MEDICINE
12 ALUMNI CENTER
13 STUDENT HOUSING
14 PARKING GARAGE
15 LEADERSHIP STUDIES

THE FAMILY OF EXTERIOR CAMPUS SIGNS CONVEYS CLEAR DIRECTIONAL MESSAGES AND REINFORCES THE UNIVERSITY BRAND. EACH SIGN TYPE SERVES A UNIQUE FUNCTION TO DELIVER A CLEAR HIERARCHY OF INFORMATION. SIGNS ARE DESIGNED FOR USE ON CAMPUS.

VEHICULAR SIGNS

The vehicular sign family has been designed to accommodate driving speeds and distances. Vehicular signs influence first impressions and contribute to a sense of arrival.

Content

Vehicular directional signs provide direction for vehicular traffic through the use of text and arrows and perform the following functions:

- Identify route and required turns
- Encourage preferred routes to destinations
- Provide guidance to primary campus districts and the key "regional" or nearby destinations as appropriate within each district.

It is not possible to list every destination; rather, a sign should carry a mix of relevant nearby and more distant destinations. Refer to Signage & Wayfinding Master Plan – Fall 2012 for an explanation.

The goal of vehicular signage is to guide motorists to appropriate destinations. For example, vehicular signs do not list Hale Library since it is not accessible to motorists. They are directed instead to the Parking Garage and Information Kiosk where pedestrian wayfinding takes over.

Vehicular messages are organized by directional groups and destinations within each group are listed in alphabetical order. There is one exception. The Parking Garage and Information Kiosk is listed at the top of the directional group in which it occurs. This destination is prioritized since it is an important source of additional parking and permit information for visitors.

Design and Legibility

Vehicular directional signs display the University logo and utilize the University's colors. Letter heights and color contrast requirements were determined by a review of roadway conditions.

Flexibility

Vehicular directional signs provide the University flexibility in updating and maintaining message panels. Updates can be made with minimal disturbance to the sign structure and foundation.

Placement

Individual sign placements must be evaluated for sight lines, legibility, and proximity to relevant intersections. Signs should precede intersections or decision points by a safe margin appropriate to travel speed. Additionally, signs should be located periodically along straight routes (as permitted by sight lines) to provide confirmation and reassurance.

STREET SIGN

LARGE VEHICULAR DIRECTIONAL

SMALL VEHICULAR DIRECTIONAL

VEHICULAR TRAILBLAZER [FREESTANDING]

VEHICULAR TRAILBLAZER [EXISTING POST MOUNTED]

▲ **VEHICULAR SIGN FAMILY**

STREET SIGNS

Inter-campus street signs identify the various roads within the campus. They also help regulate vehicular traffic movement, provide orientation and are part of the overall wayfinding system. The design retains the existing sign structure and updates the message panel.

LARGE VEHICULAR DIRECTIONAL

Large vehicular directional signs are located on University property along the campus perimeter (where space and sight lines permit) and outside of the City of Manhattan public right-of-way. They provide a strong sense of arrival and give guidance to primary campus destinations such as the Athletics Complex, Parking Garage, and Veterinary Medicine.

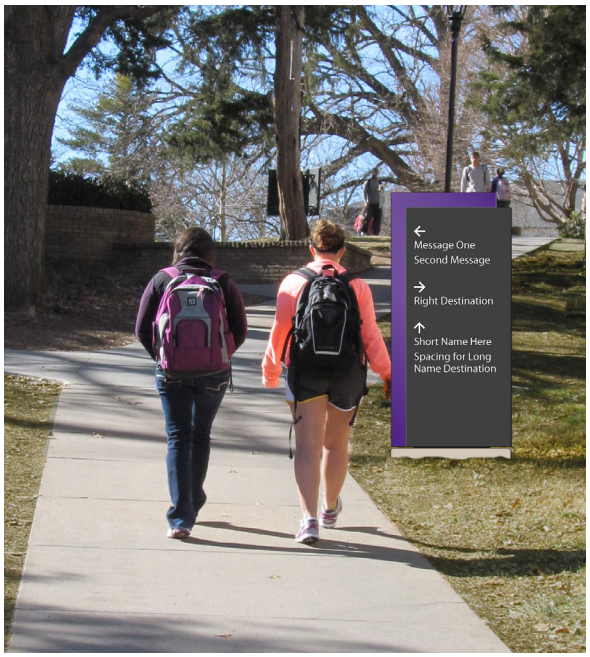
SMALL VEHICULAR DIRECTIONAL

Small vehicular directional signs are located on University property along the inter-campus roadway network where travel speeds and road complexity is reduced. They also may be used in the southern portion of campus perimeter, where traffic patterns permit. Signs must be placed outside of the City of Manhattan public right-of-way.

VEHICULAR TRAILBLAZERS

Trailblazers announce immediate turns to major destinations and confirm motorist routes. They also support the wayfinding system in areas with minimal space for signs. They may be installed as freestanding signs or mounted on existing posts.

THE PEDESTRIAN SIGN FAMILY COMPLEMENTS THE NATURAL AND ARCHITECTURAL CAMPUS SETTING AND COORDINATES CLOSELY WITH VEHICULAR SIGNS. SIGNS ACCOMMODATE PEDESTRIAN VIEWING DISTANCES AND SPEEDS.



PEDESTRIAN SIGNS

Content

Pedestrian directional signs provide direction for pedestrian traffic through the use of text and arrows and perform the following functions:

- Provide clear direction to the most common destinations
- Compliment intuitive wayfinding
- Promote primary campus destinations
- Promote pedestrian navigation within a ten minute walking radius
- Promote preferred paths to minimize conflicts with vehicular routes and capitalize on campus assets

Design

Pedestrian directional signs utilize the University's colors. Signs should be double-sided where practical to maximize value.

Legibility

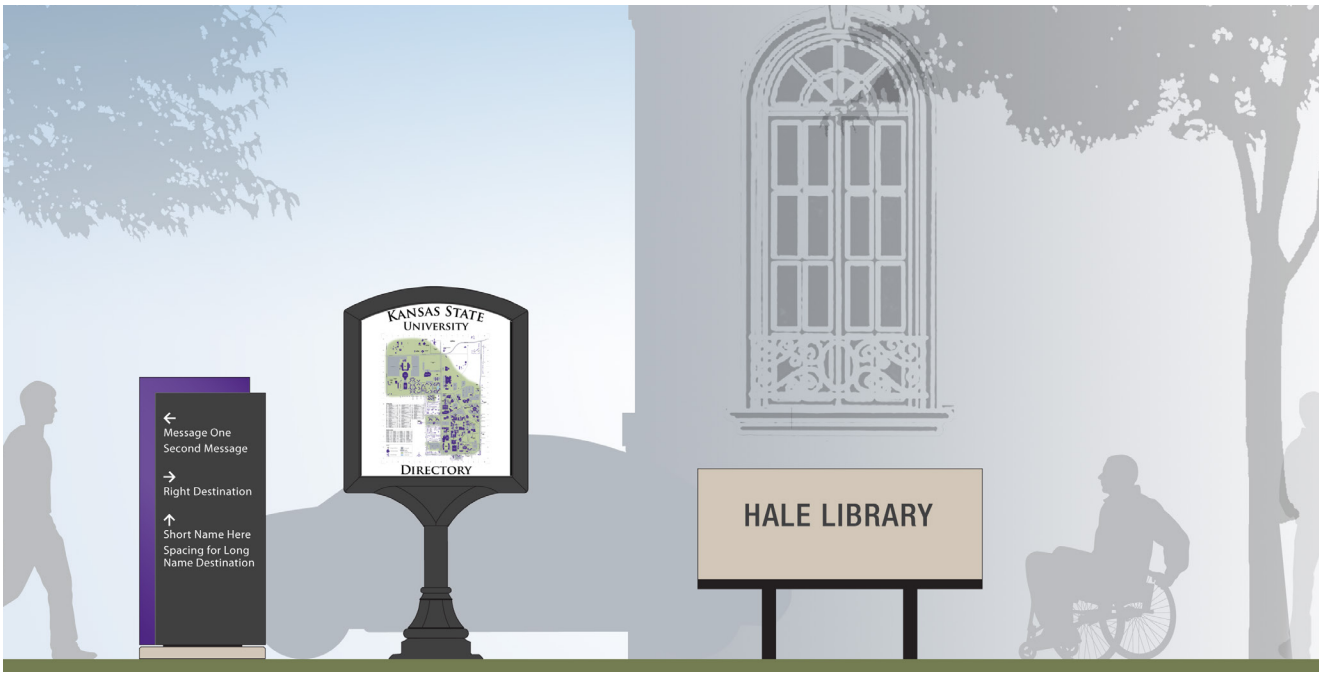
Letter height requirements for the pedestrian sign family were determined by a review of campus pedestrian pathway network and typical viewing distances.

Flexibility

Pedestrian directional signs have been designed to provide the University flexibility in updating the message content. Updates can be made with minimal disturbance to the sign structure and foundation.

Placement

Individual sign placements need to be evaluated for sight lines, legibility, and proximity to relevant pathway intersections. Signs should be located periodically along straight routes (spaced as required by sight line conditions) to provide confirmation and reassurance. Additionally, signs should be located at campus thresholds and parking areas where visitors enter campus. Multiple signs along the same pathway should stay to the same side of the path and align, where practical.



PEDESTRIAN DIRECTIONAL

MAP KIOSK

BUILDING IDENTIFICATION

▲ PEDESTRIAN SIGN FAMILY

PEDESTRIAN DIRECTIONAL

Pedestrian directional signs are generally placed within the main core of campus at major decision points along primary pedestrian routes. They direct to key pedestrian destinations such as Student Union, McCain Auditorium, Hale Library, Anderson Hall, and the Parking Garage.

MAP KIOSK

The pedestrian map kiosk signs are generally the first signs visitors will encounter after parking and leaving their vehicles. This sign type retains the existing sign structure. Contained within the unit are a "You Are Here" map of the campus, directory information, and a contact number for the Security and Traffic Information desk. Kiosks should be placed at parking facilities, drop off locations, transit stops and at key intersections and gathering places on campus as well as along primary pedestrian routes to supplement directional signs.

BUILDING IDENTIFICATION

The building identification sign marks the entrance and arrival to all University buildings and facilities. Uniformly designed and consistently placed near entrances, these signs aid in wayfinding as pedestrians intuitively understand "where to look" for names of buildings.

APPENDIX - CAMPUS INFRASTRUCTURE

CAMPUS INFRASTRUCTURE ASSESSMENT AND PLANNING WAS COMPLETED TO SUPPLEMENT THE CAMPUS MASTER PLAN UPDATE.

ADDITIONAL INFORMATION ON THE WATER DISTRIBUTION SYSTEM, STORMWATER SYSTEM, AND SEWER COLLECTION SYSTEM CAN BE FOUND IN THE REPORT PREPARED BY BG CONSULTANTS.

ADDITIONAL INFORMATION ON THE CHILLED WATER SYSTEM, ELECTRICAL DISTRIBUTION SYSTEM, AND STEAM/CONDENSATE SYSTEM, AND CAN BE FOUND IN THE REPORT PREPARED BY STANLEY CONSULTANTS.

WATER DISTRIBUTION SYSTEM

In January of 2013, BG Consultants finalized the Kansas State University Water Distribution System Master Plan Evaluation which can be primarily considered a system wide Capacity Evaluation. The first component of this evaluation was to establish current and future distribution system capacity. The second component of this evaluation was to estimate the total project cost to improve the infrastructure to meet existing and proposed future needs.

The information contained herein summarizes a complete 2025 University Master Plan Update – Water Distribution System Report, which may include: Additional commentary, charts, photographs, graphs, figures, complete cost estimates, and system maps.

Extensive referencing was not included in this Executive Summary. If additional information is required, it is recommended to review the complete Water Distribution System Report.

ES 1.1 Existing Conditions

The water distribution system that is owned and operated by Kansas State University consists of multiple types and sizes of pipe. Below is a table that summarizes the current inventory of water distribution piping which includes Ductile Iron Pipe (DIP), Cast Iron Pipe (CIP), Plastic PVC pipe, Galvanized Pipe, and Copper Pipe. The inventory was created from existing as-built plans with the best information available to the engineer at the time of this report.

The majority of the water distribution piping is of unknown material, however due to the age of the distribution system and the flows observed during field testing, it is expected that the majority of the unknown pipe material is cast iron.

Currently, the Main Campus Distribution System is supplied by two connection points located on the corner of Kimball Ave. and Denison Ave. and north of the Center for Child Development. The Kimball/

TABLE 1.1 INVENTORY OF EXISTING WATER DISTRIBUTION SYSTEM

DIAMETER	MATERIAL (LINEAR FEET)						
(in.)	UNKNOWN	DIP	CIP	PVC	GALVANIZED	COPPER	TOTAL
3/4						217	217
1	1,659					37	1,696
1-1/4						128	128
1-1/2	28						28
1-3/4	46						46
2	911	533			247		1,691
2-1/2	31						31
3	767	330	116				1,213
4	17,910	178	2,138				20,226
6	18,502	2,725	6,979	416			28,622
8	6,625	1,565	1,414	6,979			13,004
10	4,320	2,117	6,567				3,814
16	3,814						3,814
24		803					803
TOTAL	54,613	8,251	17,395	7,395	247	382	88,102

Denison connection is a 24" connection that reduces down to 16" and again down to 10" before it enters the distribution system at the Power Plant. This 10" line supplies a booster pump that is located in the Power Plant.

The pump controls are set to turn the pump on and maintain a constant pressure in the immediate downstream piping of 80 PSI. This pump has no bypass and spins freely when downstream pressure is above 80 PSI.

ES 2.1 Distribution Modeling

The K-State distribution system was modeled using a computer program called WaterCAD (Select Series 3) developed by Bentley Products. Each pipe of the distribution system was imported into the programs data base from the latest Campus Master Origin AutoCAD File provided by University personnel. The AutoCAD file and computer model were then compared to as-built drawings that were also provided by University personnel in order to confirm waterline locations, material, and size.

Field calibration is a critical step in the development of any hydraulic analysis. Field calibration requires that the existing system be "stressed" at one or more points to evaluate how the remaining portions of the system react. The stress points within the calibration sequence are flowing fire hydrants. This is evaluated with the use of pressure gauges and pitot gauges, which will show the flowing pressure for any fire hydrant within the system.

On March 22, 2012 and March 28, 2012, BG Consultants with the assistance of University Staff conducted flow testing of numerous fire hydrants throughout the Campus. All of the calibration tests where completed with the 10" Connection open. A few tests were completed with the 10" Connection closed such as testing of the booster pump and select zone tests used to confirm system performance with this connection closed.

The main objective during the calibration process is to determine the coefficient of friction, or "C" factor for each type and size of pipe. The "C" factor is adjusted to reflect the reduced amount of flow a particular pipe can allow as the pipe ages or as encrustation builds. As a point of reference, new PVC pipe typically has a "C" factor around 150. After approximately 20 years under normal service conditions PVC pipe typically has a "C" factor around 140. Ductile Iron Pipe as well as Cast Iron Pipe typically has a "C" factor around 130 new and can range greatly from around 110 to 80 after 20 years. The exact amount that the "C" factor is reduced after a period of time can vary greatly depending on multiple variables including water quality and amount of water usage. A "C" factor of 60 is considered to be very low. A "C" factor that is as low as 60 is equivalent to an approximate reduction in pipe diameter of 25%. While a "C" factor of 40 is equivalent to an approximate reduction in pipe diameter of 36%. The K-State calibrated computer model produced expected "C" factors that ranged from 40 to 130.

ES 2.2 Water Demand

Water use data was collected from numerous sources that included Johnson Controls, the City of Manhattan, and K-State personnel. All of this data was evaluated in order to determine an average daily water demand for each building on the K-State Campus during a week day in a winter month and when students are in session.

No water use data could be provided for roughly half of the buildings that are supplied by the main distribution system. A demand for each of these buildings was determined based on a comparison in size and usage of similar buildings that have a known demand. The total K-State Average Daily Demand of 962,546 Gallons was also taken into consideration when determining the demands for these buildings.

ES 3.1 System Pressures

In analyzing the distribution system for any system, one of the main concerns is the pressures provided at all points throughout the system. The Kansas Department of Health and Environment (KDHE) recommends a minimum of 20 psi in waterlines under all flow conditions. In general, we do not recommend that service pressure fluctuate more than 10 psi. We also recommend a service range of 60 psi to 80 psi for public water supply systems. We analyzed the existing system and found that static pressures throughout the system are typically well above the recommended value between 80 and 100 psi. During normal usage we found that the water distribution system works within KDHE requirements.

ES 3.2 Fire Flow Protection

Current KDHE regulations require a minimum of 6" diameter waterlines provide fire protection. Approximately 28.7% of the waterlines within the existing distribution system are smaller than 6" and 20 out of the 114 existing fire hydrants are supplied by a waterline that is smaller than 6".

During testing 7 out of the 27 fire hydrants tested could not achieve a flow rate greater than 500 gpm. After creating a distribution model using WaterCAD, it was found that 17 out of the 114 total fire hydrants could not achieve 500 gpm while maintaining 20 psi within the system. A detailed fire code analysis would be required to determine the recommend flows for each hydrant due to the various size and usage of each building across the main campus. However, it typically is recommend that all fire hydrants be able to flow a minimum of 500 gpm and that fire hydrants near large facilities, such as schools, dormitories, etc. be able to flow a minimum of 1500 gpm.

ES 4.1 Areas of Deficiencies

The existing Kansas State University Potable Water Distribution has a few deficiencies, most of the deficiencies result from areas of campus that are not covered by fire hydrants that can produce the recommended flow rate of 1500 gpm at 20 psi. There are five main areas of concern that are identified. It should be noted that there are couple of additional deficiencies that are considered to be secondary deficiencies. They include the existing booster pump, fire hydrant flow rates around the Football Stadium, fire hydrant flow rates around the Recreation Complex, fire hydrant flow rates in the area to the northwest of the intersection of Kimball and Denison Avenue, and a few various fire hydrants that are located in isolated areas that are on dead end waterlines.

It was impossible to achieve accurate computer model calibration around the football stadium and the Rec Complex due to ongoing construction at the time of field testing. However, it is expected that the fire hydrants in these areas will achieve flow rates greater than 1500 gpm.

The remaining secondary deficiencies are areas where flow rates are influenced mostly by the City of Manhattan's distribution system. These hydrants would require improvements to the City of Manhattan Distribution System in order to improve the flow rate. These fire hydrants are also usually covered by other fire hydrants that are expected to produce the recommended flow rate. Therefore, these hydrants are considered to be secondary deficiencies. As mentioned before, the Main Supply Connection enters the K-State Power Plant that supplies a 1500 gpm booster pump. The booster pump does not have a bypass and when the service pressure downstream of the pump is above 80 psi, the pump spins freely as water flows through it. This causes a drop in pressure between 3 and 17 psi, depending on the flow rate through the pump. This can reduce pressure system wide and could potentially force the booster pump to turn on more often than is necessary.

The booster pump also has the potential to limit the available fire hydrants flow rates. The maximum

designed flow rate for the pump is 1500 gpm. Therefore when a fire hydrant is opened, that hydrant can only flow at a maximum of 1500 gpm. The flow rate would be expected to be less than 1500 gpm due to friction losses as the water travels through the system.

The booster pump was originally installed to maintain K-State distribution system pressure during times when the City of Manhattan could not supply the required pressure. Since that time, the City of Manhattan has completed multiple improvement project that have decreased the amount of pressure fluctuations that the KSU Campus experiences. In addition, the second 10" Waterline Connection that was installed also helps to reduce pressure fluctuations.

It is recommended that a booster pump bypass be installed to allow for the free flow of water around the booster pump during times when the pump is not needed. However, as stated before this is considered a secondary deficiency and should be kept in mind for any future improvement plans. It is estimated that a booster bypass installation would cost approximately $50,000 or less.

ES 4.1.1 Major Deficiencies

There are 5 areas of the K-State Campus that are considered to be major deficiencies. They include area #1, the Engineering complex/Kramer Complex, Area #2, the South Jardine Apartments, Area #3, Umberger/Call Hall/Dole Hall/Mosier Hall, Area #4, the Derby Complex, and Area #5, the North Farm.

ES 4.1.2 Area #1 Engineering Complex/Kramer Complex

This area includes the following buildings: Natatorium, Ahearn Gymnasium, Fiedler Hall, Kramer Dinning Hall, and Goodnow and Marlatt Residence Halls. This recommendation will replace a 4" waterline that supplies the Natatorium and Ahearn Field House and Gym. It will also replace a 4" waterline that runs from the power plant to the Kramer Dinning Center. This recommendation will include the installation of approximately 2,800 LF of 10" PVC Waterline at an Engineers Opinion of Probable Project Cost of $419,718.75

ES 4.1.3 Area #2 South Jardine Apartment

This area includes the following buildings: Jardine Terrace H, I, N, and M. This recommendation will replace the 6" and 4" loop that services these four apartment buildings. This recommendation will include the installation of approximately 1,300 LF of 10" PVC Waterline at an Engineers Opinion of Probable Project Cost of $180,606.25

ES 4.1.4 Area #3 Umberger/Call Hall/Dole Hall/Mosier Hall

This area includes the following buildings: Military Science Building, Bushnell, Dykstra, Umberger, International Student Center, Dole, Pittman, Various Facility Shops, Call, and Mosier Halls. This recommendation will replace a 6" waterline that runs along Claflin Road from Throckmorton to Weber Hall and then north to the Center for Childhood Development. This recommendation includes the installation of a waterline that runs along Jardine Road from Denison Ave. to the Center for Childhood Development. It also includes the installation of a waterline that follows part of Mid-Campus drive from Claflin Road north to Jardine Road, this waterline will continue behind the Vet Complex and connect to the Pat Roberts Hall Waterline Loop. From here the waterline will continue east along the south property line of the proposed NBAF facility and connect to the existing 10" waterline at a point north of the Center for Child Development. This recommendation will include the installation of approximately 5,300 LF of 12" PVC Waterline and 4,300 LF of 10" PVC Waterline at an Engineers Opinion of Probable Project Cost of $947,856.25

ES 4.1.5 Area #4 Derby Complex

This area includes the following buildings: Derby Dining Center and the Haymaker Residence Hall. This recommendation will include the installation of

a new waterline loop that will wrap around the Derby Dining Center and the four adjacent Residence Halls. This recommendation will include the installation of approximately 2,000 LF of 10" PVC Waterline at an Engineers Opinion of Probable Project Cost of $278,437.50.

ES 4.1.6 Area #5 North Farm

This area includes all of the buildings and services located at the North Farm. This recommendation will include the installation of a waterline from the intersection of Marlatt and Denison Avenues north to connect with the existing water system that serves the North Farm. This recommendation will include the installation of approximately 3,240 LF of 12" PVC Waterline at an Engineers Opinion of Probable Project Cost of $323,977.50

ES 4.2 Future Expansion

The current distribution system along with the previously recommended improvements, totaling $2,150,596.25, will provide adequate domestic water supply and fire protection based on the projected future building locations as detailed in the 2025 Campus Master Plan.

STORMWATER SYSTEM

The information contained herein summarizes a complete 2025 University Master Plan Update – Stormwater System Report, which may include: Additional commentary, charts, photographs, graphs, figures, complete cost estimates, and system maps. Extensive referencing was not included in this Executive Summary. If additional information is required, it is recommended to review the complete Stormwater System Report.

ES 1.1 Introduction

Three major drainage basins were identified on the Kansas State University main campus area:

Kansas State Athletics Basin

The Kansas State Athletics Basin is approximately 114 Acres and discharges north underneath Kimball Ave. through several drainage structures. This basin includes the area southeast of the intersection of College Ave. and Kimball Ave. where Bill Snyder Family Stadium, Bramlage Coliseum, and the Indoor Basketball Practice Facility are located. This area of the basin is approximately 80 Acres and is very urban with large asphalt parking lots and the built environment for the sporting facilities. Average overland slopes range between 1.00-3.50%.

There is also a portion at the southwest quadrant of the N. Manhattan Ave. and Kimball Ave. intersection that drains to the north through drainage structures under Kimball Ave. This area is approximately 34 Acres and includes the Flint Hills Place apartment complex, part of the KSU farms and the NBAF area. This area currently has quite of bit of open space. Average overland slopes are close to 2.00%. Hydraulic analysis of the drainage structures in this area was not performed because they are not KSU owned and maintained.

Campus Creek Basin

The Campus Creek Basin is the largest basin at approximately 410 Acres. This basin is really the heart of stormwater drainage on the KSU Campus. The major element of this basin is Campus Creek which carries flow in a southeasterly direction. The common discharge point is a 7'x5' (WxH) RCB (reinforced concrete box) that crosses N. Manhattan Ave. and joins the City of Manhattan's 2-5'x4' RCB that runs underneath Bertrand St. taking flow to the east all the way to the Tuttle Creek Blvd. Channel (beautified channel on the east side of Hwy 24). This basin is definitely the most critical due to its size, number of stormwater features and historic flooding issues. The surface conditions are that of a standard college campus built environment. Average overland slopes generally range between 1.00-4.00%.

South Campus Basin

The South Campus Basin is approximately 193 Acres and discharges south to the City of Manhattan's large 2-10'x4' RCB structure underneath Anderson Ave. taking flow to the east. Stormwater from as far north as the RV Christian Track and Frank Myers Field travels southeasterly in this drainage basin that follows along the western edge of campus and includes the south half of campus between Claflin Rd. and Anderson Ave. The surface conditions are a little less impervious to the north and present more of a standard college campus built environment to the south. Average overland slopes generally range between 1.00-6.00%.

ES 2.1 Technical Methods

The general technical methods to complete this Stormwater Master Plan included surveying the infrastructure according to the KSU Control Datum and performing the existing conditions hydrologic and hydraulic analysis through a model created with the US Army Corps of Engineers Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) software. Within HEC-HMS, the SCS Method was utilized to calculate peak runoff flows and volumes. The Muskingham-Cunge Method was

utilized for pipe routing. SCS Type II design storms for a 10% and 1% frequency of occurring in any one year were calculated. These design storms are also commonly referred to as 10-year and 100-year events, respectively.

ES 2.2 Evaluation Process

The evaluation process consisted of the following major components:

1. Survey of all culverts and underground drainage pipes > 24" diameter, existing detention basins, and Campus Creek. Flowlines, pipe size, material and overflow elevation were identified for each culvert. Detention basins that existing data was not available for were topographically surveyed. A preliminary field investigation by the engineer occurred concurrently with surveying to familiarize with the drainage structures and patterns that would be modeled.

2. Determine hydrologic characteristics based on field investigation, topography and survey data, including major and minor drainage basins, runoff curve numbers and the time of concentration (lag time) for the SCS Curve Number Method.

3. Research of existing construction documents for confirming existing conditions.

4. Develop US Army Corps of Engineers Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) model network.

5. Calibrate and Run HEC-HMS Model for Existing Conditions with a 10-yr and 100-yr SCS Type II design storm. Calibration involved comparing results to historic observations and the results of a previous study conducted for construction of the Leadership Building.

6. Perform hydraulic analyses by comparing the maximum capacity of all studied drainage pipes with the results of the model analysis to assign an existing Level of Service to each structure.

7. Identify deficiencies, determine recommendations and develop cost estimates. Run model for proposed conditions. (iterative process)

ES 2.3 Assumptions and Analysis Criteria

1. Analyzed the maximum capacity of an enclosed system pipe or culvert by comparing inlet and friction control conditions. Overflow elevations were used to determine maximum headwater. Overflow elevations included top of rim shots of manholes, area inlet top of grate shots and high point ground shots over a culvert.

2. The City of Manhattan Stormwater Management Master Plan requires that stormwater infrastructure is sized to handle peak flow from a 10-year design storm. For this study, pipes are considered to be deficient when the Level of Service is less than 10. Detention basins were considered deficient when overtopping a 100-year design storm. Therefore, proposed piping recommendations meet 10-year design storm capacity requirements and proposed reservoir improvements meet a 100-year design storm capacity requirement.

3. Properly assigning SCS runoff curve numbers is important to the accuracy of model. Composite curve numbers (CN) were developed taking into account an impervious CN of 98 and pervious CN of 70. Impervious areas were spatially determined utilizing the existing Campus Map in Autocad with Carlson design software.

4. All roof drains were assumed to drain according to the KSU Master Utilities Plan. Engineering judgment was utilized when sufficient data was unavailable.

5. Campus Creek was modeled as a series of detention basins in the HEC-HMS model.

TABLE 3.1: EXISTING CONDITIONS SUMMARY

MAJOR BASIN	ACREAGE	NO. OF SUBBASINS	PIPES >24"	DETENTION BASINS	DEFICIENCIES
KANSAS STATE ATHLETICS	114	13	9	0	3 PIPES
CAMPUS CREEK	414	89	76	14	31 PIPES 5 DETENTION BASINS
SOUTH CAMPUS	193	43	28	1	5 PIPES

ES 3.0 Existing System Conditions

The existing stormwater system at Kansas State University is in overall fair condition. Many locations have been identified with deficiencies and potential future problems. The following table is a summary for the results of the HEC-HMS model.

ES 4.1 Recommendations

The recommendations presented provide a complete solution for all existing deficient stormwater areas based on the model results. The total cost for all improvements is $5.1M. Of this total, the Campus Creek mainline system improvement projects are approximately $2.5M, Project 10 for enclosing the channel for the Vet Med complex is discretionary at $860,000, and the remaining $1.7M is for other projects across the KSU campus. The estimates do not include utility relocations.

The improvement projects presented upsize capacity deficient pipes and improve the entire Campus Creek mainline system so that overtopping of streets is eliminated. These recommendations should be approached conscientiously. It is recommended that KSU Facility staff continue to monitor the stormwater system in flooding events.

ES 4.2 Stormwater Policy Recommendation

It is recommended that KSU Facilities adopt a stormwater policy to limit developed peak flows to existing conditions for future site development in a manner similar to the City of Manhattan.

Underground detention (under parking) can provide significant reductions in peak stormwater flows when enough space is not available for conventional detention. Additionally, each site should consider low impact development (LID) techniques to achieve pre-developed peak flows. There are many LID techniques, including buffers, bioretention, green roofs, permeable pavers, rain barrels and cisterns, etc., and should be coordinated with the recommendations from the Landscaping portion of the Master Plan. With proper policy and planning, stormwater can be managed in the future build-out of Kansas State University.

ES 4.3 Project 1: Rec Center Diversion and Pat Roberts Hall

EOPC: $240,000

With the new detention ponds constructed for NBAF, the existing detention facility directly south of Pat Roberts Hall is now under-utilized. An analysis was conducted that determined the detention pond

south of Pat Roberts could also handle the runoff created from the Rec Complex Practice Fields. Approximately 950 linear feet of 36" RCP would be needed to tie into the existing area inlet located just south of the rec fields. The pipe would run east and cross under Denison Ave. before connecting into the existing detention pond at an estimated slope of 0.60%. Diverting this flow to the Pat Roberts detention does not completely alleviate capacity problems for the downstream Rec Complex/Denison Corridor system, but it certainly helps. Without this improvement, the Rec Complex/Denison Corridor system had 10 deficient pipes (essentially the entire system). With this improvement, the Rec Complex/Denison Corridor System will have 4 deficient pipes. The Pat Roberts Detention will need to be maximized and a spillway installed because the model is currently showing a Q100 elevation at the top of bank.

ES 4.4 Project 2: Tennis Court Diversion

EOPC: $110,000

The pipe that runs under the tennis courts is a double 24" RCP. It currently severely restricts stormwater flows in the Rec Complex/Denison Corridor system due to the upstream pipe being a double 30" RCP. The existing conditions analysis shows that the double 24" RCP's are currently 279% over maximum capacity. With Project 1 above this pipe becomes less stressed but is still 204% over maximum capacity. This project constructs a 30" RCP diversion around the south side of the tennis courts. The existing pipe under the tennis courts will remain live and an approximate 50/50 flow split should be designed at the area inlet junction box just west of the tennis courts. This project makes replacement of the existing pipe unnecessary, a very favorable prospect with the recent renovations to the tennis courts.

ES 4.5 Project 3: Mosier Hall Detention Facility Expansion

EOPC: $360,000 (min)

The existing detention pond south of Mosier Hall is the largest detention basin on Kansas State University. When at capacity it can hold approximately 12 ac-ft. of runoff. The analysis shows that for existing conditions the pond decreases peak flows by nearly 33% in a 10-year design storm and 14% in a 100-year event. This detention basin is critical to Kansas State's existing and future infrastructure. It has been determined that this drainage area has the potential for increased storage. By maximizing this detention, the storage can be nearly doubled to contain 18 Ac-Ft. of runoff at full capacity.

This proposed detention facility was estimated assuming some type of pilot channel to help low flow conditions, address maintenance issues and improve erosion control. The floor of the basin should be a minimum 2% slope from the toe of the side slopes to the pilot channel. The side slopes of the basin were assumed to be 3:1. For estimating purposes, the pilot channel was assumed to be a 4' flat bottom concrete channel with 3:1 side slopes for 1' of depth. The actual design should verify capacity for a 2-year design storm. This channel can incorporate natural rock lining, permeable pavers or be left as natural as possible. If left natural, the design must carefully consider flow velocities and scouring. The detention basin can also be beautified through retaining walls, incorporate retention similar to the Jardine basin where water is always present, and other landscaping. There is also a pedestrian path in this area that must be considered during design. There are many options here which is why the estimate is presented as a minimum only.

The estimate does not include utility relocations which may be necessary. However, some consideration to utilities was made. The pedestrian path was left in place as it is over an existing steam tunnel and adequate cover was checked for a new

high power electrical line known to exist under the basin.

ES4.6 Project 4: New Call Hall Detention

EOPC: $285,000

The area directly north of Call Hall has the potential for a new detention facility. Stormwater flow from the dorm parking area north of Weber Hall currently flows through an open channel in this area. To give this detention facility enough capacity to make a difference, it recommended that the existing pipe crossing Jardine Drive, currently a (2)4'x2' CMAP crossing and discharging into the detention south of Mosier Hall, be replaced at a lower flowline (approximately 2') with single 36" RCP. There is enough depth available in the Mosier Hall detention basin for this and would be easy to accomplish with Project 3 above. The new Call Hall Detention creates approximately 2.5 Ac-Ft of maximum storage volume.

Projects 5-8

To lessen flooding impacts and prevent overtopping of streets that cross Campus Creek, there are four existing culverts that require upsizing and are presented in Projects 5 through 8. Additionally, the existing 7'x5' RCB under N. Manhattan Ave. should be upsized to a (2)8'x5' RCB to prevent overtopping at N. Manhattan Ave. However, replacement of this structure would be a City of Manhattan project Discussions with the City revealed that they are aware of the need for more stormwater capacity for the Bertrand system that Campus Creek discharges to but project planning was estimated to be at least 15 years away.

ES4.7 Project 5: Mid-Campus Drive Open Channel

EOPC: $610,000

Currently this portion of Campus Creek is 805' of (2)4'x4' RCB and (2)6'x4' RCB. The 2025 master planning documents have a vision for this portion of Campus Creek to be converted into an open channel. This is also a great concept for stormwater hydraulics and gaining needed detention in the Campus Creek system. Existing parking would be removed with this project. The new channel was assumed to have a 10' flat bottom with 3:1 side slopes and adds 3.0 Ac-Ft of storage to the existing downstream open channel section.

This project will also replace an existing (2)4'x4' RCB, with a (2)5'x4' RCB. This culvert connects the Mosier Hall Detention to the proposed Mid-Campus Drive Open Channel and is located underneath Jardine Dr.

ES4.8 Project 6: Claflin Rd. Structure Replacement

EOPC: $320,000

This project will replace an existing (2)6'x4' CMAP, with a (2)5'x5' RCB. This culvert connects the proposed Mid-Campus Drive Open Channel to the Campus Creek open channel by the International Studies Center and is located underneath Claflin Rd.

ES4.9 Project 7: Old Claflin Rd. Structure Replacement

EOPC: $90,000

This project will replace an existing 9'x6' RCB, with a (2)6'x5' RCB. This culvert connects the Campus Creek open channel by the International Studies Center to the Campus Creek open channel by the Leadership Studies Building and is located underneath Old Claflin Rd.

ES4.10 Project 8: Petticoat Lane Structure Replacement

EOPC: $140,000

This project will replace an existing 12'x5' Arch Bridge with a (2)10'x6' RCB. This culvert connects the Campus Creek open channel by the Leadership Studies Building to the Campus Creek open channel in between Petticoat Ln and Campus Creek Rd. and is located underneath Petticoat Ln.

ES4.11 Project 9: Campus Creek Rd. Detention Expansion

EOPC: $400,000

This project maximizes the available detention in the Campus Creek open channel section located between Petticoat Ln and Campus Creek Rd. The flowline to the outlet structure has a concrete flume that drops 3.42'. By reconstructing this flume and connecting the detention basin inlet and outlet flowlines on a straight grade, a significant amount of storage can be obtained. This project includes a pilot channel with grades similar to that discussed for the expansion of Mosier Hall detention in Project 3. There is a pedestrian path in this area that must be considered during design. By maximizing this detention, the storage can be increased by 7 Ac-Ft at full capacity.

ES4.12 Project 10: Veterinary Medicine RCB

EOPC: $860,000

Project 10 is a discretionary project associated with potential build-out for Veterinary Medicine east of Mosier Hall. In preparation for this project, an estimate has been provided at the request of Facilities staff to enclose the stormwater channel located there now. This would require a 1,110' long (2)5'x5' RCB. At the top (north end) of this channel is a 60" RCP from the NBAF detention pond and a 30" RCP from the Pat Roberts Hall detention pond. Because future flows from the NBAF site are unknown, the max capacity of the 60" RCP, 280 cfs, was added to the existing flow in this channel, approximately 115 cfs at the south end, and an allowance was made for increased flows from the Vet Med build-out. The estimated max capacity for the (2)5'x5' RCB is 460 cfs. It is recommended that the conditions from the NBAF site for full buildout be completely understood for optimizing the size of this proposed RCB as it is a very significant project both in magnitude and cost.

ES4.13 Project 11: Upsizing Other Existing Deficient Pipes

Recommendations for upsizing of all other deficient pipes identified in the existing system analysis are itemized in Appendix B of the full report. These are pipes not previously incorporated into proposed projects 1-10. EOPC's for these areas are summarized below.

It is recommended that all deficient pipes be monitored during heavy rain events to verify potential problems and determine if replacement truly is a priority. The pipes that are over capacity will potentially create some ponding as well as surcharging

TABLE 4.1: SUMMARY OF OTHER UPSIZING PROJECTS

PROJECT	BASIN	DESCRIPTION	EOPC
11a	1	KANSAS STATE ATHLETICS BASIN	$330,000
11b	2	REC COMPLEX/DENISON CORRIDOR	$195,000
11c	2	DENISON AVE./JARDINE DR. INTERSECTION	$100,000
11d	2	SERUM PLANT RD./JARDINE DR. INTERSECTION	$130,000
11e	2	THROCKMORTON TO CAMPUS CREEK	$370,000
11f	2	SOUTH MID-CAMPUS DR./OLD CLAFLIN RD INTERSECTION	$65,000
11g	3	EAST SIDE KSU INDOOR PRACTICE FOOTBALL FACILITY	$175,000
11h	3	WEST OF KSU UNION PARKING GARAGE	$185,000
11i	3	SOUTH OF BEACH ART MUSEUM	$60,000
11j	3	NORTH OF PARKING LOT WEST OF MEMORIAL STADIUM	$85,000
		TOTAL	$1,695,000

which may heave manhole lids. Depending on the area, ponding may not create an immediate concern and it will just be an inconvenience until water levels recede. If these pipes in the areas of concern are creating problems such as safety hazards, excessive maintenance or flooding of real property, these improvement projects should be implemented without delay.

SEWER COLLECTION SYSTEM

The information contained herein summarizes a complete 2025 University Master Plan Update – Sewer Collection System Report, which may include: Additional commentary, charts, photographs, graphs, figures, complete cost estimates, and system maps. Extensive referencing was not included in this Executive Summary. If additional information is required, it is recommended to review the complete Sewer Collection System Report.

ES 1.0 Existing Infrastructure

The collection system boundary can generally be described as East of Denison, West of North Manhattan Avenue, South of Jardine Drive and North of Anderson Avenue. Once north of Jardine Drive, the collection system drains to City of Manhattan sewer system to the east, west, and north.

The Kansas State University sanitary sewer collection system has approximately 26,570 feet of 8" through 24" diameter gravity sewer main. There are many service lateral pipes that are 4 inch and 6 inch in diameter which are part of the collection system but outside the current scope of this collection system evaluation. Approximately 168 manholes were inspected during this evaluation.

This system inventory was developed following the review of as-built drawings and the data compiled from on-site field investigation of system manholes. Minor discrepancies may exist in the system inventory due to assumptions that were made in the field or inconsistencies associated with as-built drawings. These inconsistencies may only be found and corrected through Level 2 (full entry) manhole inspections, smoke testing, dye testing and Closed Circuit Television (CCTV) inspection of the sewer mains. The following table summarizes the major sewer main components of the collection system.

ES 2.0 Evaluation Process

The sanitary sewer evaluation process consisted of the following major processes by BG Consultants:
1. Reviewed existing electronic AutoCAD data and established field survey requirements.

2. Conducted field investigation of manholes: surveyed top of rim, surveyed flow lines of pipes and took inspection photos.

3. Processed survey data and compared to existing KSU as-built drawings.

	GRAVITY SEWER DIAMETER (INCHES)						
MATERIAL	8	10	12	15	20	24	TOTAL
CONCRETE			253				253
VCP	9,233	4,350	3,566	1,755	1,020	365	21,409
PVC	1,060	309	3,114	425			4,908
TOTAL	10,293	4,659	2,180	1,020	1,120	365	26,570

4. Established a best fit sewer collection system layout in AutoCAD including pipe size, pipe material and invert elevations.

5. Imported AutoCAD data into the SewerCAD program and built the Sewer CAD model.

6. Established existing "Estimated" Building Average Daily Flow (ADF) values and "Measured" Building ADF values (consistent with water master plan estimates).

7. Evaluated the proposed Kansas State project and phasing plan (10/15/2012) which identified:
   a. Proposed Building Name and Use/Type
   b. Approximate Gross Square Foot Area
   c. Map Reference to Identify Building Location
8. Developed ADF and Peak Daily Flow (PDF) for each proposed building.

9. Developed and calibrated the SewerCAD model to show the existing and proposed estimated ADF and PDF conditions.

10. Identified conduits that had 25% or less remaining capacity and created 2 system maps for the following scenarios:
   a. Existing Conditions:
      i. Dry Weather Conditions (Peak Factor = 1)
      ii. Wet Weather Conditions (Peak Factor = 3)
   b. Proposed Conditions:
      i. Dry Weather Conditions (Peak Factor = 1)
      ii. Wet Weather Conditions (Peak Factor = 3)

11. Developed total infrastructure improvements cost estimates for existing and proposed campus build out conditions based on upsizing all conduits that had 25% or less capacity remaining.

12. Developed infrastructure improvement recommendations

ES 3.0 Existing ADF and PDF

To determine the Average Daily Flow (ADF) conveyed by the sewer system, water use data was collected from numerous sources that included Johnson Controls, the City of Manhattan, and KState
personnel. All of this data was evaluated in order to determine an average daily water demand for each building on the K-State Campus during a week day in a winter month and when students are in session.

A sewer model was developed in SewerCAD based on the system layout that was developed in AutoCAD and the estimated building ADF rates. The total daily flow from each building was assessed to a 10 hour operational period and then fitted to a diurnal patter that is estimated to replicate campus water use. The model was then processed for ADF and then a corresponding Peak Daily Flow (PDF).

The Existing ADF and PDF summary results for Pipes is shown below:

FLOW CONDITION	25% REMAINING CAPACITY OR LESS
ADF	1 Pipe Segments
PF 1.5	4 Pipe Segments
PF 2.0	12 Pipe Segments
PF 3.0	48 Pipe Segments

The Existing ADF and PDF summary results for Manholes are shown below:

	SURCHARGE VALUE (IN PERCENTAGE OF TOTAL MANHOLE DEPTH)			
FLOW CONDITION	5-25	25-50	50-75	75-100
ADF	41			
PF 1.5	53			
PF 2.0	62			
PF 3.0	64	10	3	5

These model results indicate that approximately 48 pipes are between 75-100% full and 5 manholes are close to Sanitary Sewer Overflow (SSO) conditions under Existing PDF rate conditions.

ES 4.0 Proposed ADF and PDF

The proposed ADF and PDF rates are based on estimated sewer loading rates from the proposed buildings identified in the 2025 Kansas State Master Plan. The ADF rates were calculated based on estimating the total usable floor space, occupants (units) per square foot, the resulting number of occupants, average daily load per occupant and finally average daily load per building.

The computer modeling process for ADF and PDF was similar to the process that was followed under the existing conditions model development.

The Proposed ADF and PDF summary results for Pipes is shown below:

FLOW CONDITION	25% REMAINING CAPACITY OR LESS
ADF	12 Pipe Segments
PF 1.5	36 Pipe Segments
PF 2.0	74 Pipe Segments
PF 3.0	94 Pipe Segments

The Existing ADF and PDF summary results for Manholes are shown below:

	SURCHARGE VALUE (IN PERCENTAGE OF TOTAL MANHOLE DEPTH)			
FLOW CONDITION	5-25	25-50	50-75	75-100
ADF	49		0	6
PF 1.5	61	3		7
PF 2.0	50	18	9	18
PF 3.0	41	21	12	39

These model results indicate that approximately 94 pipes are between 75-100% full and 39 manholes are close to Sanitary Sewer Overflow (SSO) conditions under Existing PDF rate conditions.

ES 5.0 Evaluation Considerations

1. Average Daily Flow Peaking Factors (ADF PF) depend on:
   a. Material and Age of the system
   b. Amount of Rainfall and Proximity to groundwater and creeks (Campus Creek)
   c. Cross connections (sump pumps, rain gutters, foundation drains and storm drains)
   d. System deterioration level (Crack, Break, Fracture, Broken and Collapse)

2. The actual ADF and Peak Wet Weather Flow capacity projections were estimated based on the best information available at the time this report was produced. Ultimately, these estimates should be verified against actual Flow Monitoring data. This is the most precise way to calibrate the model to establish more accurate ADF peaking factors that can be used for planning purposes.

3. It should be noted that the ADF and PDF SewerCAD modeling results were based on "Clear Pipe" conditions, but it is possible that "Constricting Pipe" conditions may exist (such as a root intrusions, collapsed pipes or offset joints) which could produce significantly different field conditions.

4. No CCTV information was available during the development of this report. CCTV Inspection and Evaluation would provide the following information:
   a. Accurate sewer main size and material type for the entire sewer main segment
   b. Sewer main tap conditions and locations from upstream and downstream manholes.
   c. Defective system components including: offset joints, broken sections, collapsed sections, root intrusions, vertical sags and vertical deformations.
   d. Baseline system condition to be used in Capital Improvement Program

ES 6.0 Recommendations and Cost Estimates

Recommendations:

1. It is recommended to perform Closed Circuit Television (CCTV) Inspection of the sewer mains to properly quantify the deteriorated state. It is very possible that deteriorated conditions exist that require immediate rehabilitation. If and when this CCTV inspection is performed, it is recommended to conduct it in accordance with the North American Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) industry standard.

2. It is recommended to perform a sewer flow monitoring study to verify the SewerCAD model predictions, match diurnal flow patterns and correctly assess the PDF that will dictate the existing improvement requirements.

3. It is recommended to improve the sanitary sewer infrastructure as the proposed building construction sequence dictates so that all the wastewater is conveyed safely without SSO's or system back-ups.

4. As buildings are constructed, it is recommended to improve pipes to the diameter that is required for full build-out conditions.

Cost Estimate for Existing PDF Conditions:

The Engineers Opinion of Probable Cost to improve the collection system so that the estimated existing PDF are contained without pipe backups or SSO's includes the upsizing of approximately 8,500 feet of gravity sewer main pipe and the replacement of 60 sewer manholes as shown below:

BID ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	MOBILIZATION AND INCIDENTALS	1	LS	-	$200,004
2	CCTV CLEANING, INSPECTION AND EVALUATION	26,600	LF	$2.50	$66,500
3	STANDARD PRECAST MANHOLE (8'-0" HEIGHT)	60	EA	$3,846.00	$230,760
4	8" DIAMETER PVC SEWER MAIN	80	LF	$55.00	$4,400
5	10" DIAMETER PVC SEWER MAIN	2,850	LF	$60.00	$171,000
6	15" DIAMETER PVC SEWER MAIN	100	LF	$75.00	$7,500
7	18" DIAMETER PVC SEWER MAIN	1,550	LF	$85.00	$131,750
8	21" DIAMETER PVC SEWER MAIN	450	LF	$100.00	$45,000
9	24" DIAMETER PVC SEWER MAIN	1,120	LF	$110.00	$123,200
10	30" DIAMETER PVC SEWER MAIN	365	LF	$130.00	$47,450
11	BUILDING SERVICE CONNECTION	45	EA	$4,000.00	$180,000
12	FLOWABLE FILL	1,870	CY	$90.00	$168,300
13	CONCRETE SURFACING	2,240	SY	$100.00	$224,000
	CONSTRUCTION CONTINGENCY (10% OF #1-13)				$159,986

TOTAL CONSTRUCTION COST	$1,759,850
ENGINEERING & INSPECTION SERVICES	$439,962
TOTAL PROJECT COST	**$2,199,813**

Cost Estimate for Proposed Conditions:

The Engineers Opinion of Probable Cost to improve the collection system so that proposed PDF are contained without pipe backups or SSO's includes the upsizing of approximately 17,760 feet of gravity sewer main pipe and the replacement of 105 sewer manholes is shown below:

BID ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	MOBILIZATION AND INCIDENTALS	1	LS	-	$394,902
2	CCTV CLEANING, INSPECTION AND EVALUATION	26,600	LF	$2.50	$66,500
3	STANDARD PRECAST MANHOLE (8'-0" HEIGHT)	105	EA	$3,846.00	$403,830
4	8" DIAMETER PVC SEWER MAIN	1,450	LF	$55.00	$79,750
5	10" DIAMETER PVC SEWER MAIN	6,100	LF	$60.00	$366,000
6	12" DIAMETER PVC SEWER MAIN	2,350	LF	$65.00	$152,750
7	15" DIAMETER PVC SEWER MAIN	2,450	LF	$75.00	$183,750
8	18" DIAMETER PVC SEWER MAIN	1,550	LF	$85.00	$131,750
9	21" DIAMETER PVC SEWER MAIN	1,150	LF	$100.00	$115,000
10	24" DIAMETER PVC SEWER MAIN	1,150	LF	$110.00	$126,500
11	30" DIAMETER PVC SEWER MAIN	370	LF	$130.00	$48,100
12	BUILDING SERVICE CONNECTION	45	EA	$4,000.00	$180,000
13	FLOWABLE FILL	4,025	CY	$90.00	$362,250
14	CONCRETE SURFACING	4,830	SY	$100.00	$483,000
	CONSTRUCTION CONTINGENCY (10% OF #1-14)				$309,408

TOTAL CONSTRUCTION COST	$3,403,490
ENGINEERING & INSPECTION SERVICES	$850,872
TOTAL PROJECT COST	**$4,254,362**

CHILLED WATER SYSTEM

This Chilled Water Master Plan investigates the chilled water system on the campus of Kansas State University (KSU) in Manhattan, Kansas. The University has selected Stanley Consultants to investigate the current campus chilled water system and provide options for growth of these systems as the campus continues to expand in size and number of students. Planning includes short term growth (through year 2017) and long term growth (through year 2025). Growth projections are described in Section 3, tabulated in Appendix A, and shown graphically on the drawings in Appendix B.

Chilled Water Capacity

As discussed in Section 2, there is currently adequate chiller capacity at the Cooling Plant to provide sufficient N+1 capacity to campus at peak cooling load. However, recent projects such as the East Stadium Welcome Center and Purple Masque Theatre have added cooling loads to the Cooling Plant and now, prior to adding any additional loads, it is necessary to increase cooling capacity in order to maintain N+1 capacity.

An additional 4,000 tons of cooling is anticipated to provide for additional loads through the year 2017. A new chiller plant located near the Wind Erosion Laboratory with two 2,000 ton chillers and accommodations for two additional 2,000 ton chillers is recommended. This site was selected in coordination with KSU and the Campus Master Plan to minimize disturbances to existing and proposed campus buildings, to avoid costly customization, and to minimize the costs involved with bringing additional electrical power to the plant. Refer to the Electrical Utility Master Plan for new substation location and associated electrical project costs.

The estimated cost includes a chiller plant with two 2,000 ton chillers and space for two future chillers. Buried 24" CHW piping from the plant to the existing north loop piping is included. Excluded are electrical utility costs. Refer to Electrical Utility Master Plan.

New 4,000 ton Chiller Plant near Wind Erosion Laboratory: $15.3 million

Cross-Connection (Chem-Biochem with North Loop)

It is recommended that cross-connections be added between the different loops in the chilled water system. Each will add needed redundancy to the system, help to ensure a reliable chilled water supply, and improve operational flexibility to isolate sections of the system without compromising delivery to the rest of the loop. Suggested routings and sizes for these proposed cross-connections are shown on the drawings provided in Appendix B.

The cross-connection between the Chem-Biochem Loop and the North Loop is proposed to run from the corner of Claflin Road and Mid-Campus Drive to the chem-biochem loop near Shellenberger Hall. Parts of the existing Chem-Biochem loop piping are undersized (less than 18" diameter) for the proposed cross-connection, and will need to be replaced. This work should be coordinated with the installation of the new CHW piping for the new plant.

Cross-connect Chem-Biochem with North Loop: $570,000

Current Projects

Engineering Complex Phase IV: The engineering complex buildings are currently cooled by the central plant. The expansion project should include the cost of up-sizing the CHW supply and return mains to accommodate the expansion.

College of Business Administration: A new academic building is planned near the corner of Manhattan Ave. and Lover's Lane. The building project should include provisions for CHW cooling and the CHW supply and return mains.

East Stadium: The East Stadium Welcome Center Project is now complete and adds a cooling load of approximately 116 tons to the south loop.
West Stadium: The Purple Masque Theatre Project is now complete and adds a cooling load of approximately 102 tons to the south loop.

Seaton Hall College of Architecture: Currently about half of Seaton Hall is on the CHW loop. The College of Architecture addition should include up-sizing the existing CHW piping. Approximately 109,000 square feet of space would need to be converted for CHW loop cooling. This work should be included in the current project.

Kramer Complex: Kramer, Marlatt, and Goodnow are currently on the north loop. The renovation of this complex will provide local chillers. The existing CHW piping will remain in place, but will normally be closed.

Justin Hall: An expansion is planned for Justin Hall. This building is currently cooled by the Chem-Biochem CHW loop, and the CHW supply and return lines are of sufficient size for the expansion.

Vet-Med Complex: Master plans for the new Vet-Med Complex include utilizing local chillers. With that in mind, it is not economical to provide any CHW loop piping north of Call Hall at this time. In the future, consideration should be given to utilizing those chillers (and possibly expanding capacity) as another satellite plant by connecting to the north loop.

Existing Building Conversions

Existing buildings that do not utilize the CHW loop should be considered for conversion of their existing systems and connecting to the loop. The projected loads in this study reflect future projects and adding existing buildings to the loop.

Certain buildings can be converted to central cooling without an extensive amount of modifications to the distribution piping. These building are either already connected to or near existing distribution lines. Also, buildings with local chilled water systems in place would require a minimal amount of work to convert to the loop system as compared to buildings with no cooling or with only window units.

Window units are relatively inefficient when compared to central cooling. However, buildings with only window units would require an extensive amount of work within the building to convert to chilled water. Ductwork and piping would need to be routed throughout the building. This may be considered if the building is due for a significant renovation. If KSU chooses not to convert these buildings within the timeframe of this study (2025), the projected peak cooling load is reduced by nearly the capacity of one 2,000 ton chiller.

Each building is listed in Section 4 of this report, describing their current systems and conversion costs. Cost estimates for converting existing buildings to utilize the central CHW loop are based on the buildings' occupancy types, current cooling systems (if any), and square footage. These estimates are intended to provide a high level look at what buildings should be considered for the CHW loop.

An in-depth study is recommended for each building to be considered. A building study should include a thorough investigation of the building's existing systems, detailed costs involved with converting it to CHW, and a cost-benefit analysis including possible energy savings.

Install Additional Chilled Water Capacity

In order to maintain N+1 capacity to future loads beyond the year 2018, additional chilled water production must be installed. An additional 4,000 tons of cooling is anticipated to provide for additional loads through the year 2023. This will provide adequate N+1 capacity during the time (2020) that chillers #5 and #6 would be taken out of

service. If the plant was installed with space available for the new chillers, the cost is estimated to be:

Two new 2,000 ton chillers: $9.4 million

Cross-Connection (Chem-Biochem with South Loop)

The cross-connection between the Chem-Biochem Loop and the South Loop includes increasing the pipe size in the tunnel below 17th Street, installing buried pipe south to Anderson Avenue, east to the Beach Art Museum, north along Butterfly Drive and Mid-campus Drive to the Chem-Biochem loop. Parts of the existing Chem-Biochem loop piping are undersized (less than 18" diameter) for the proposed cross-connection, and will need to be replaced.

Cross-connect Chem-Biochem with South Loop: $3.0 million

Replace Chiller No. 5

In order to maintain N+1 capacity to future loads beyond the year 2025, replace existing Chiller #5 in the Cooling Plant in 2023 with a chiller of equal or greater capacity (1,250 tons). As stated earlier, it is anticipated that this chiller will reach the end of its service life and be taken out of service by year 2020.

Chiller No. 5 Replacement (1,250 tons): $1.4 million

Cost Estimates

The cost estimates are consistent with a study level of detail. They are not based on a quantity takeoff from a detailed design. Actual costs may vary with the actual scope determined by the design process. Cost estimates are given in 2012 dollars representing present value and do not incorporate inflation. Cost estimates given below include margin for undeveloped design details (25%), overhead (15%), profit (10%), and construction contingencies (10%).

Existing System Considerations

Several pieces of equipment in the existing chilled water system are at or near the end of their useful service life and may require replacement within the timeframe of this study. This is summarized below.

- In the Cooling Plant, Chiller #5 will be nearing the end of its useful service life by 2020.

- In the Power Plant, Chiller #6 will be nearing the end of its useful service life by 2020.

- In the Power Plant, Chiller #7 will be nearing end of its useful service life by 2025.

- The chilled water pumps have an estimated median service life of 20 years. These may require replacement or refurbishment within the timeframe of this study and should be evaluated regularly to verify reliable operation.

- The fill and/or mechanical internals of some cooling towers may require replacement before 2025. The tower performance and internal equipment should be evaluated regularly to verify reliable operation.

- At Ackert Hall, the local chiller and cooling tower have reached the end of their useful service life and are in need of replacement. Replace these units with roof top units to provide emergency air conditioning for animals.

- Utilize the recently-installed building metering system to monitor chilled water usage for the individual buildings. Developing historical data will help identify inefficiencies in specific buildings.

Central vs. Local Cooling

Local chillers can be noisy and produce vibration, which is a concern with most of the campus buildings. Mechanical rooms and systems can be designed to minimize the amount of vibration and noise transferred to the occupied parts of the building, but there are additional costs associated with that and it can be difficult to implement on

existing buildings. Additionally, KSU has expressed concern with the appearance of cooling towers on campus and the plume they can produce. Again, this can be minimized by custom designed towers or architectural structures, but at a higher cost. Refer to Appendix D for general options for cooling towers.

It is recommended that KSU continue to pursue utilizing the central chilled water loops for cooling new and existing buildings. A centrally located system is typically more efficient and provides redundancy and reliability across the entire loop. Energy and maintenance costs are also typically lower than utilizing smaller, local units. With much of the infrastructure already in place (central plant, pumps, and distribution lines), several campus buildings can be added to the CHW loop by extending branch lines from the mains to the buildings. Whether or not it is an economical decision primarily depends on the distance from the mains and the current type of mechanical system in the building. An in-depth study is recommended for each building to be considered.

Outsourcing Utility Systems

As an alternative to utilizing in-house staff for operation and maintenance of the chilled water production, the work could be outsourced to a contractor who in turn would provide chilled water to the campus for a fee based on usage. A contract must be set up in a detailed manner and must be written in a manner to protect the university's assets. The contractor may be responsible for the chiller plant only, or their scope may include the distribution system also. However the contract is written, an accurate metering system is required.

Outsourcing may relieve the University of their plant O&M responsibilities; however, there are several concerns of which to be aware. Providers are in business to make a profit. They do not always work in the long term best interest of the university. Even if the contract is set up in a very detailed manner, operations and maintenance firms can try to skew the operations and maintenance of the facilities to maximize profits and minimize costs. University staff will still be needed to monitor the work, making sure that contractual agreements are met.

Based on our knowledge of other client experiences, we have found that in most cases universities are dissatisfied with these types of contracts. We recommend KSU continue to operate and maintain their chilled water production with in-house staff.

ELECTRICAL DISTRIBUTION SYSTEM

The purpose and objective of this study is to evaluate the Campus Primary Distribution System as follows:

1. Update the loading condition on each loop after converting 4,160 volt loads to 12,470 volts.

2. Evaluate the electrical primary system including the substations and the 12,470 volt campus loops for future expansion of the campus up to the year 2025.

3. Review the electrical distribution system, including discussions with engineering and plant personnel.

4. Review of the present and future projected load capabilities.

5. Review and analyze the existing electrical loads and verify the appropriate modification work which should be performed.

6. Assess the existing low voltage unit substations, in buildings fed from the 4160V Loop, conditions and compliance with the applicable electrical code.

7. Provide recommendations to modify and upgrade the existing system to current code requirements and provisions for anticipated future electrical system loads and expansion.

8. Provide cost estimates of the proposed recommendations for upgrade of the electrical distribution system.

This study does not reflect any detail design for recommendations provided. It is recommended that a detailed design be performed based on applicable local and national standards in coordination with individual building and utility requirements.

Existing Electrical Distribution System

The present Kansas State University (KSU) Campus electrical distribution system is supplied from two (2) sources provided by Westar Energy:

1. The Southwest Substation has a maximum rated capacity of 21 MVA.

2. The Campus Substation has a maximum rated capacity of 22.4 MVA.

Two (2) underground distribution systems are utilized on the campus:
1. 4,160 volts
2. 12,470 volts.

In 2010 the University converted the majority of the 4,160 volt loads to 12,470 volts;

1. The yet to be converted, 4,160 volt system consists of sixteen (16) feeders directly fed from a 5 MVA transformer located at the Power Plant. It should be noted here that the Power Plant no longer has operational generators. This being the case there are no sync issues to contend with across the “Open” switches” in the East, Center and West Loops.

2. The 12,470 volt system consists of fifty-six (56) feeders organized into three (3) feeder loops that feed the east, west, and central parts of the campus. The Campus and Southwest substations were recently updated to carry these loops.

A study was performed July 25, 2007 by Morrow Engineering to identify the loop configurations. During this time, Morrow Engineering also performed short circuit and load flow studies to determine the adequacy of the equipment ratings.

As-Built drawings, labeled “12.5kV DISTRIBUTION SYSTEM MODIFICATION MODIFICATIONS PROJECT A-010700”, were also provided to KSU from Morrow Engineering on December 20, 2010 for the conversion of several 4,160 volt fed buildings to the 12,470 volt campus loop system.

Primary Distribution System Analysis and Electrical Equipment Evaluation

Substations

The existing substations have sufficient capacity to feed the existing campus under normal conditions. Based on utility data through February 2012, the maximum peak demand load occurred on September 2011 for both substations and was 23.536 MW. The Combined Substations load comparison for the period from November 2010 through February 2012 shows a decline of -0.611 %.

In the event the Southwest substation is lost during summer (i.e. August and September) peak conditions, the Campus substation (with a maximum capacity of 22.4 MVA) will be at or above its capability to supply the peak demand load.

An additional substation will be required for future loops to the farm area in the far northwest part of campus and for the proposed chiller plant.

Proposed Chiller Plant

The proposed chiller plant will require direct feeds from the 12,470 volt system to feed the chillers and the building they will be housed in. In order to achieve this, a new substation is required, as the existing loop system does not have enough capacity for this additional load.

For this electrical analysis, we will explore the worst case scenario which requires six (6) 2,000 ton chillers. It is assumed that every 1,000 tons of cooling requires 351.4 kVA. The first phase of the chiller installation, in the year 2013, will require 4,000 tons, or 1.405.6 MVA. The second phase of the chiller installation, in the year 2017, will require an additional 2,000 tons, or 0.7028 MVA. The third phase of the chiller installation, in year 2020, will require 6,000 tons, or 2.108.4 MVA. In total, 4.2168 MVA will be required just to run the chillers. It is recommended to provide 6 MVA to the chiller plant to account for building and auxiliary loads. A new substation with a capacity of 20 MVA is recommended. Due to the limited space on campus, the favorable location for the new chiller plant is near Vet Med, as there is ample land for a new substation. The proposed location of this chiller plant is east of the Wind Erosion Laboratory as shown on sheet 8 of the plan drawings located in Appendix A.

12,470 Volt Distribution

This system was recently updated and is in good condition per the University's comments. Based on cable ampacity, each loop has an approximate capacity of 13 MVA, allowing a maximum total load of 39 MVA for three loops. With proposed loads added to the loop system, the approximate peak demand load on the combined loop system is 26.1MW.

4,160 Volt Distribution

Most of the 4,160 volt distribution is in poor condition and is not code compliant. This distribution will be converted to 12,470 volts and shall be code compliant at that time.

480 Volt Unit Substation

The existing 480 volt unit substations fed off the 4,160 volt distribution are in poor condition and do not comply with current code. These unit substations will be updated at the same time the 4,160 volt system is converted to a 12,470 volt system and shall be code compliant at that time.

Metering Equipment

Currently, the primary system is metered by Westar and there is one meter at each substation. The University does not have a centralized data collection system. The University is in the process of updating the secondary metering system by connecting the low voltage metering to the building automation system. An effective way to manage the demand load, maximum peak demand load, outages, control switching, future modifications, and monitor the entire campus power system is to have a Supervisory

Control and Data Acquisition (SCADA) system. A SCADA system uses power monitoring devices, distributed throughout the system, to collect power data and to determine the condition of the power system in real time.

NFPA 70E Requirements

The National Fire Protection Association Standard for Electrical Safety in the Workplace (NFPA 70E) requires facility owners to perform an arc flash hazard analysis prior to allowing a worker to perform a task on energized equipment. An arc flash hazards analysis evaluates the potential for incident energy levels resulting from a potential arc flash occurrence. Analysis results determine the flash protection boundary distance, and are the basis for the selection of personal protective equipment (PPE) required for working in various situations. The policies concerning the use and type of PPE are the burden of the Owner and Operator of the facility. Analysis results are also used to develop the basic approach for performing electrical modification or design to reduce arc flash hazards. A short circuit study and a protective relay coordination study must be performed as part of the arc flash hazards analysis for the entire campus primary and secondary systems. These studies should include all facilities on the campus.

Electrical inspectors are enforcing the new labeling requirement published in the National Electrical Code (NEC 110.16) that states a warning label must be placed on electrical equipment that may remain energized during maintenance or repair.

Alternative Energy Sources

Using alternative energy sources can help reduce the electrical load on the campus loop system. This study does not provide in-depth research of alternative energy sources for the Kansas State University campus. However, the following are energy sources that the campus may want to explore.

• Solar (Photovoltaic) Energy: Solar energy is a possible option for individual buildings. Typically these systems will not provide enough energy to serve an entire building, however they may work well for smaller loads.

• Wind Energy: Wind is a possible option for sections of the campus. There is a requirement for large empty land for the wind farm to be installed. Also, the proximity of the wind farm to the campus is important for human and animal comfort.

Conclusions

Substations

Each of the two existing substations will continue to serve the campus in the existing and future load conditions, with the exception of the new chiller plant.

The combined total nominal capacity of all of the transformers at both substations is 35 MVA. The maximum campus peak demand load based on utility data is 23.54 MW. In the event that either substation lost power, the other substation would be unable to supply the peak demand load.

Distribution

The current campus distribution consists of three 12,470 volts loops. Each loop has a several sectionalizing switches. One of the sectionalizing switches (i.e. the “Tie Point”) located approximately near the “electrical middle” of the loop is normally operated in the “OPEN” position. During normal operations approximately half of each loop is fed from the Southwest Substation and the other half is fed from the Campus Substation. This results in an increase in reliability by being able to feed the loads from either the Campus or Southwest substations sources and allows for maintenance of each piece of equipment. The current capacity of these loops is sufficient to maintain the system during normal operating conditions.

Not all campus buildings are fed directly from the 12,470 volt system. Several buildings are fed through a 4,160 volt system that is directly fed from a 5,000 kVA transformer located at the powerhouse. If this transformer were to fail, it would be extremely difficult to feed the 20 buildings that are currently being fed from that system. It is worth noting that switching these buildings to the 12,470 volt loop system will not increase the distribution system capacity requirements as they are already accounted for via the 4,160 volts, 5,000 kVA transformer located at the Powerhouse.

The Campus Creek Complex is currently using a 480 volts transformer as the main source for this building. The 480 volts feed comes from the Chem/Biochem building nearby. This transformer is undersized due to several expansions to the building, and it is not directly connected to a reliable loop system. If there were any shut down at the Chem/Biochem building, the Campus Creek Complex would also have to shut down as well.

The effects of the additional campus building expansion on the loop system are shown below.

TABLE ES-1 LOAD SUMMARY - CAMPUS LOOPS (CURRENT CONDITIONS)

LOOP	CONNECTED LOAD (kW)	DEMAND (kW)	COINCIDENCE FACTOR	COINCIDENCE PEAK (kW)
WEST LOOP	15,726	12, 002	0.6	7,202
CENTER LOOP	22,984	15,546	0.6	9,328
EAST LOOP	14,650	9,011	0.6	5,407
TOTAL	53,360	36,559		21,937

Source: Stanley Consultants, Inc.

TABLE ES-2 LOAD SUMMARY - CAMPUS LOOPS (PROPOSED CONDITIONS)

LOOP	CONNECTED LOAD (kW)	DEMAND (kW)	COINCIDENCE FACTOR	COINCIDENCE PEAK (kW)
WEST LOOP	20,031	15,040	0.6	9,025
CENTER LOOP	21,895	14,723	0.6	8,859
EAST LOOP	21,178	13,720	0.6	8,238
TOTAL	63,104	43,483		26,122

Source: Stanley Consultants, Inc.

Recommendations

Substations

• Provide an additional substation and loop for all campus expansion beyond the year 2025.

• A substation of minimum capacity of 20 MVA is recommended to be constructed on the east side Wind Erosion Laboratory. Proposed location is shown on sheet 8 of the plan drawings located in appendix A

Distribution

The remaining loads served by the 4,160 volt system at present should be migrated to the 12,470 volt system in the near future. Transfer of the loads to the 12,470 volt system should be carefully planned such that each loop will be balanced.

To provide the system with the necessary serviceable equipment for safe and reliable operation, the following action items are recommended:

• Increase the kVA rating from 112.5 to 300 of the transformer at the Campus Creek Complex.

• Provide the remaining section of the 12,470 volt duct bank and cable feeders to the Campus Creek Complex.

• Complete the replacement of all 4,160 volt to 12,470 volt distribution.

• Installation of metering equipment and SCADA for the 12,470 volt distribution system and interconnection with the campus building management system.

• Change the sectionalizing "Tie-points" on the 12,470 volt loops to enable better balancing of the loads on the loop system.

• Convert remaining overhead lines located on campus property to underground distribution.

• Main service entrance panels are recommended to be replaced in 21 buildings after they are converted from 4,160 volts to 12,470 volts.

• Perform a complete short circuit, coordination, and arc flash analysis with labeling to comply with NFPA 70E for the safety of KSU staff and technicians.

A detailed construction cost estimate has been provided in Appendix C. Below is a summary:

TABLE ES-3 COST SUMMARY

PROJECT	ESTIMATED COST
4,160 VOLTS TO 12,470 VOLTS CONVERSION	$3,050,786
NEW LOADS - LOOP ADDITIONS	$689,765
EAST LOOP	$6,022,724
TOTAL	$9,763,275

Source: Stanley Consultants, Inc.

*Equipment only. Primary feeder to new substation and connection not included.

STEAM AND CONDENSATE SYSTEM

This Steam and Condensate Master Plan investigates the steam and condensate systems on the campus of Kansas State University (KSU) in Manhattan, Kansas. The University has selected Stanley Consultants to investigate the current campus steam and condensate systems and provide options for growth of these systems as the campus continues to expand in size and number of students. Planning includes short term growth (through year 2017), and long term growth (through the year 2025). Growth projections are described in Section 3, tabulated in Appendix A, and shown graphically on the drawings in Appendix B. The table below shows all building projects expected to be completed and result in additional campus steam load by 2025. Section 3, tabulated in Appendix A, and shown graphically on the drawings in Appendix B.

TABLE ES-1 BUILDING PROJECTS (2025)

PROJECT NAME	ADD'L NET AREA (SQUARE FEET)	ADD'L STEAM LOAD (PPH)
FIEDLER HALL – ENG COMPLEX PHASE IV	80,000	3,530
JUSTIN HALL EXPANSION	16,376	556
SEATON HALL COLLEGE OF ARCHITECTURE	125,000	4,243
COLLEGE OF BUSINESS ADMINISTRATION	140,000	5,054
VET-MED COMPLEX	486,968	10,724
ACKERT HALL EXPANSION	76,000	3,676
CARDWELL HALL EXPANSION	16,200	715
COLES HALL EXPANSION	128,000	6,192
KSU UNION EXPANSION	89,000	2,870
NEW CLASSROOM BUILDING	66,000	2,383
NORTH OF DICKENS – NEW BUILDING	10,000	361

Source: Stanley Consultants, Inc.

Currently, the Power Plant provides an operational steam production capacity of 320,000 pounds per hour and an N+1 capacity of 240,000 pounds per hour. The additional loads from the buildings listed above minus the load of the Kramer Complex (local boilers by 2017) would increase the total load to approximately 206,000 pounds per hour. No additional steam capacity is needed to maintain N+1 reliability through the year 2025.

New Buildings

With the excess capacity of the steam system, new buildings should consider connecting to the loop to avoid the unnecessary cost of local boilers. However, buildings that are not near the existing steam distribution require the additional cost of utility tunnels or buried pipe. The following new building projects are recommended for central steam:

College of Business Administration: A 140,000 square foot academic building to house the College of Business Administration is planned near the corner of Manhattan Ave. and Lover's Lane. This building could utilize the excess steam capacity from the power plant. However, approximately 700 feet of tunnel would need to be installed to bring the steam to the building at a cost of $2.9 million. Alternatively, geothermal or hybrid-geothermal heating and cooling should be considered. See "Alternative Energy Sources" below. It is recommended to perform Formation Thermal Conductivity Tests (approximately $5,000 to $6,000 per bore) as part of a GSHP study.

Vet-Med Complex: The new Vet-Med Complex includes approximately 323,000 square feet of existing space (Mosier and Trotter) and 164,000 square feet of planned new space. This complex should utilize the excess steam capacity from the power plant. Approximately 1,200 feet of tunnel would need to be installed to bring the steam to the building. The estimated cost for a new 1,200 foot long steam tunnel with a 10" steam main is $5.0 million.

Classroom Building: A 66,000 square foot classroom building is planned to the north of Waters Hall. This is a new building and it should utilize the excess steam capacity from the power plant. Approximately 400 feet of tunnel would need to be installed to bring the steam to the building. The estimated cost for a new 400 foot long steam tunnel with a 6" steam main is $1.7 million. Alternatively, a direct-buried conduit system for steam and condensate could be installed for an estimated $250,000.

North of Dickens – New Building: A 10,000 square foot building is planned to the north of Dickens Hall. This is a new building and it should utilize the excess steam capacity from the power plant. The building is near existing steam mains, so no additional cost (above that of the project) is anticipated.

Cost Estimates

The cost estimates are consistent with a study level of detail. They are not based on a quantity takeoff from a detailed design. Actual costs may vary with the actual scope determined by the design process. Cost estimates are given in 2012 dollars representing present value, do not incorporate inflation, and include margin for undeveloped design details (25%), overhead (15%), profit (10%), and construction contingencies (10%).

Steam Distribution

The University has reduced high pressure steam (HPS) from 225 psig to 150 psig and is in the process of removing PRV stations from the distribution system to allow 150 psig steam to be distributed to each building through existing medium pressure steam (MPS) lines and low pressure steam (LPS) lines. Standardizing on a campus-wide 150 psig building steam supply pressure will help to preserve equipment, simplify the steam distribution system, and improve accessibility to PRV stations. The following items are recommended:

• MPS and LPS systems need to be evaluated for the higher pressure (150 psig) steam prior to removing PRV stations from the distribution system.

• Removing PRV stations from the distribution system to allow 150 psig steam to be distributed to each building through existing MPS lines and LPS lines. Approximate locations are shown on the drawings in Appendix B.

• New PRV stations are to be provided at several buildings, reducing steam pressure from 150 psig to 5 psig. (Certain science buildings and laboratories require 90 psig steam.) Consider using 2-stage, dual-train PRV stations in the buildings. Refer to Appendix D for additional information.

Distribution Piping

In the event of a major steam leak in the distribution piping, the University has limited ability to isolate sections of the steam supply headers without shutting off steam supply to multiple buildings. The addition of a steam tunnel between the Derby and Van Zile dormitory complexes would provide the ability to tie together the East and North Headers, while also being a relatively short distance. This would ensure reliable steam supply while saving money and energy, and would provide more system redundancy than currently exists. The following items are recommended:

• Provide a cross-connection between the North and East steam headers. The estimated cost for a new 600 foot long steam tunnel with a 10" steam main between the Derby and Van Zile dormitory complexes is $2.5 million.

• The campus steam distribution piping and condensate return piping vary in age and condition. It is recommended that the University continue to be proactive in monitoring and replacing aging steam and condensate pipe whenever possible in order to prevent failures before they happen.

Condensate Return

In many instances, condensate return pipe is routed on the floor of the steam tunnel. Routing of the condensate pipe on the floor leaves the pipe and its supports exposed to liquid that may accumulate in the tunnel due to system leaks or tunnel infiltration. It is recommended that when new condensate lines are installed, they be located off the floor to extend the life of the piping.

The University is currently in the process of replacing the electric condensate pumps at the Willard Hall collection site with steam-driven mechanical pump traps. It is recommended that the University continue the replacement of electric condensate pumps with mechanical pump traps in condensate collection systems.

Makeup Water

Currently, there is only one 10" water line to the Power Plant. This lack of redundancy presents a risk if there is a problem with that pipeline. Loss of makeup water poses a threat of steam interruption to campus. It is recommended that the Power Plant have a second main water line installed, supplied by a different city water main than the one currently used.

Utility Tunnels

It is recommended that a full system evaluation be performed on the utility tunnel system. The University should continue to proactively repair tunnels as they near the end of their service lives to prevent future outages or emergencies. Campus personnel indicated the most problematic areas are in the tunnel running parallel to Claflin Road from Mid-Campus Drive to the Derby residence hall complex, and in the tunnel running north from Hale-Farrell Library to Waters Hall. Tunnels near Ackert and Chalmers Halls are also considered problematic due to steam leaks.

Central vs. Local Steam Generation

It is recommended that KSU continue to pursue utilizing the central steam distribution for heating new buildings. A centrally located system is typically more efficient and provides redundancy and reliability across the entire campus. Energy and maintenance costs are also typically lower than utilizing smaller, local units, and with much of the infrastructure already in place (central plant and distribution lines), new buildings can utilize the excess capacity of the power plant by extending branch lines from the mains, to the building. Whether or not it is an economical decision primarily depends on the distance from the mains.

Alternative Energy Sources

Several alternative energy sources for building heating are discussed below. In general, advantages to using alternative energy sources include reduced emissions and improved public relations.

Solar Thermal Energy: Solar thermal can be a cost effective, renewable energy source when utilized in the proper application. From our experience, heating domestic water can be an economical application in the Kansas area for buildings with a consistent and significant DHW load. This requires locating solar panels near the building system, usually on the roof. The appearance of the panels on campus buildings may be a concern. This may be a long term (15+ years payback) investment but will provide energy savings and reduce CO2 emissions. Individual building studies are recommended to estimate costs and potential savings.

Geothermal Energy: Ground-source heat pumps (GSHPs) use the constant temperature of the earth as the exchange medium instead of the outside air temperature. This ground temperature is warmer than the air above it during the winter and cooler than the air in the summer. The GSHP takes advantage of this by exchanging heat with the earth through a ground heat exchanger. As with any heat pump, GSHPs are able to heat, cool, and, if so equipped, supply the building with hot water.

Hybrid geothermal systems using several different geothermal resources or a combination of a geothermal resource with outdoor air (i.e., a cooling tower), are another technology option.

Hybrid approaches are particularly effective where cooling needs are significantly larger than heating needs.
The installation price of a geothermal system can be several times that of an air-source system of the same heating and cooling capacity. However, the additional costs can be returned in energy savings in 5 to 10 years. System life is estimated at 25 years for the components inside the building and 50+ years for the ground loop.

In order to be cost effective (minimize pumping power requirements), an available open space for the ground loop must be near the building. The space can be a green space, athletic field, or parking lot. A parking lot however, is not a preferred option. One option to pursue at KSU is the space between the planned College of Business Administration and the President's Residence. A ground loop in this area could possibly serve both buildings and avoid the costs of installing a steam tunnel and buried CHW piping. The distance from the central loop to this location improves the cost competitiveness for use of geothermal in this location, as the cost to install a steam tunnel and pipe to the College of Business Administration building is estimated at $2.9 million.

Another option is the green space between Mid-Campus and Butterfly Drive, which could serve Anderson and Eisenhower Halls. Although these buildings are currently on the central steam loop, the geothermal system would be more energy efficient and would contribute to the cooling load.
The costs of a geothermal system vary greatly depending on several factors including the

conductivity of the soil. A slight change in conductivity can significantly impact the performance of the system. It is highly recommended to perform Formation Thermal Conductivity Tests (approximately $5,000 to $6,000 per bore) as part of a GSHP study before proceeding to design.

Outsourcing Utility Systems

As an alternative to utilizing in-house staff for operation and maintenance of the steam production, the work could be outsourced to a contractor who in turn would provide steam to the campus for a fee based on usage. A contract must be set up in a detailed manner and must be written in a manner to protect the university's assets. The contractor may be responsible for the steam plant only, or their scope may include the distribution system also. However the contract is written, an accurate metering system is required.

Outsourcing may relieve the University of their plant O&M responsibilities; however, there are several concerns of which to be aware. Providers are in business to make a profit. They do not always work in the long term best interest of the university. Even if the contract is set up in a very detailed manner, operations and maintenance firms can try to skew the operations and maintenance of the facilities to maximize profits and minimize costs. University staff will still be needed to monitor the work, making sure that contractual agreements are met.

Based on our knowledge of other client experiences, we have found that in most cases universities are dissatisfied with these types of contracts. We recommend KSU continue to operate and maintain their steam production with in-house staff.


WILDCATS

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CAMPUS MASTER PLAN UPDATE TASK FORCE

Ruth Dyer, Senior Vice Provost for Academic Affairs, Chair
Dale Billam, Classified Senate
Andrea Blair, Disability Support Services
Kate Bormann, Student Governing Association
Pat Bosco, Division of Student Life
Lorn Clement, Department of Landscape Architecture, Regional and Community Planning
Bob Condia, Faculty Senate
Gerry Craig, Department of Art
Tim de Noble, Deans Council
Abe Fattaey, Campus Planning and Facilities Management
Julia Keen, Department of Architectural Engineering and Construction Science
Bonnie Rush, Department of Clinical Sciences
Chris Sorensen, Department of Physics
Ken Stafford, Information Technology
Pinakin Sukthankar, graduate student in Biochemistry
Zelia Wiley, College of Agriculture
Ex officio
Bruce Shubert, Vice President for Administration and Finance

STAFF

Kirby Barrett, Landscape Technician, Campus Planning and Facilities Management
Dave DeBusman, Project Coordinator, Campus Planning and Facilities Management
Melanie Klein, Landscape Architect II, Campus Planning and Facilities Management
Victoria L'Ecuyer, Administrative Specialist, Campus Planning and Facilities Management
Mark Taussig, Associate Director of Planning, Campus Planning and Facilities Management
Annette Rohde, Project Coordinator, Campus Planning and Facilities Management

STAKEHOLDER GROUPS

Kansas State University

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Division of Facilities, Services Department, Refuse Control
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Graduate School
Horticulture, Forestry, and Recreation Resources Department
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Intercollegiate Athletics
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K-State Student Union Foodservice
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Landscape Advisory Committee
Office of Admissions
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Office of Planning and Analysis
Office of the President
Office of the Provost
Office of Student Life
Office of Vice President for Research
Open Forum Attendees
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Student Governing Association
University Parking Services

Local Community

Aggieville Business Association
City of Manhattan Staff and Officials
Flint Hills Area Transportation Authority (ATA)
Manhattan Urban Area Planning Board
Mercy Regional Health Center
National Bio and Agro-Defense Facility, U.S. Department of Homeland Security
Riley County
St. Isidore's Catholic Student Center

IDEA GENERATION WORKSHOP PARTICIPANTS

All members of the Campus Master Plan Update Task Force were invited to participate in the Idea Generation workshops. Additionally, the following individuals were invited to represent the wide-ranging interests of the university:

Darwin Abbott, Director of Parking Services
Jeff Barnes, Assistant Director of Parking Services
Ben Champion, Director of Sustainability
Kelli Cox, Director of Planning and Analysis
Larry Fox, Director of Real Estate, Kansas State University Foundation

Grant Hill, Student Governing Association
Derek Jackson, Director of Housing and Dining Services
Kerry Jennings, Classified Senate
Katie Kingery-Page, Faculty Senate
Cathie Lavis, Chair of Landscape Advisory Committee
Mike Lynch, Associate Vice President for Student Life
April Mason, Provost and Senior Vice President
Adam Ragoschke, Graduate Student Council
Brad Sidener, Senior Vice President and Chief Financial Officer, K-State Alumni Association
Reid Sigmon, Senior Associate Athletic Director
Ron Trewyn, Vice President for Research
David Weaver, Vice President for Real Estate and Investments/Chief Information Officer, Kansas State University Foundation

CONTACT INFORMATION

Kansas State University

Abe Fattaey
University Architect and Director of
Campus Planning and Facilities Management
Dykstra Hall
Manhattan, KS 66506
785-532-1725
abepeaia@ksu.edu

CONSULTANT TEAM

Campus Master Planning
Signage and Wayfinding Master Planning

Ayers Saint Gross Architects + Planners
1040 Hull Street, Suite 100
Baltimore, MD 21230
410-347-8500
www.asg-architects.com

Water Infrastructure Planning

BG Consultants
4806 Vue Du Lac Place
Manhattan, KS 66503
www.bgcons.com

Transportation Planning

Martin Alexiou Bryson, PC
400 West Chase Boulevard, Suite 530
Raleigh, NC 27607
919-829-0328
www.mabtrans.com

Space Needs Analysis

Paulien & Associates, Inc.
899 Logan Street, Suite 508
Denver, CO 80203
303-832-3272
www.paulien.com

Energy Infrastructure Planning

Stanley Consultants
8501 West Higgins Road, Suite 730
Chicago, IL 60631
www.stanleyconsultants.com

Landscape Architecture

Vireo
929 Walnut St, Suite 700
Kansas City, MO 64106
816-756-5690
www.bevireo.com

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